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CAPREOLUS ON ESSENCE AND EXISTENCE
Norman J. Wells

PLATONISM IN POSITIVISM
Tadeusz Gierymski

ATOMIC PHYSICS AND REALITY
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Chronicle

BOOK REVIEWS

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CAPREOLUS ON ESSENCE AND EXISTENCE

Mr. Norman J. Wells *received his M.A. and Ph.D. from the University of Toronto. He has written for the* New Scholasticism *and is in the process of writing an article for* Collier's Encyclopedia. *He is now an assistant professor at Boston College.*

It is news to no one that research in medieval philosophy has achieved and is achieving fruitful results not only for our understanding of that period alone but also for our understanding of the Greco-Roman period and the early modern period. No small part of that research has been devoted to the thought of St. Thomas Aquinas, a fact which is certainly responsible for the vitality of Thomism in our day. One interesting aspect of this vitality is manifested in what has recently been termed the "purgative way"[1] of modern Thomism. Such a catharsis was certainly the purpose of Father W. Norris Clarke, s.j., in his article "What is Really Real?"[2] His request for critical explorations of his thesis[3] has been accepted by at least two scholars, Father Edmund W. Morton, s.j.,[4] and, more recently, Father James I. Conway, s.j.[5]

It is the purpose of this paper to add to the historical background of Father Clarke's original paper by an examination of a very influential exponent of the position he has criticized. This exponent is one of the *Thomistae*,[6] the *Princeps Thomistarum*, John Capreolus.[7] The place and date of his birth are considered to be Rodez in France about 1380. He entered the Dominican order and was reading the *Sentences* at Paris in 1409. His teaching career took him to many Dominican convents, one of which is Toulouse. He died at Rodez in 1444. The work upon which his fame rests is his *Defensiones Theologiae Divi Thomae Aquinatis*.[8] It must be realized that with Capreolus we are at the confluence of the Thomism of the primitive Thomists and the Thomism of the later classic commentators. We are dealing with a

man inspired by such persons as Hervaeus Natalis, Peter Marsh, Bernard of Auvergne, and John of Naples, and who in turn inspires such later classic Thomists as Cajetan, Sylvester of Ferrara, Javellus, and Soncinas.[9]

[1]Joseph Owens, C.SS.R., *St. Thomas and the Future of Metaphysics* (Milwaukee: Marquette Univ. Press, 1957), p. 51. Note also C. Fabro, "L'Obscurcissement de l'*esse* dans l'école thomiste," *Revue Thomiste*, LVIII (1958), 443-78.

[2]See *Progress in Philosophy* (Milwaukee, 1955), pp. 61-90. Note also Father Clarke's commentary on Father Phelan's paper in the *Proceedings of the American Catholic Philosophical Association*, XXXI (1957), 128-32.

[3]*Progress in Philosophy*, pp. 89-90.

[4]See "The Nature of the Possible According to St. Thomas Aquinas," *Proceedings of the American Catholic Philosophical Association*, XXXII (1958), 184-89.

[5]See "The Reality of the Possibles," *New Scholasticism*, XXXIII (1959), 139-61; 331-53.

[6]Without involving itself directly in the dispute between Fathers Clarke and Conway, this examination will afford data for an ultimate assessment of that unavoidable and radical tension in "traditional Thomism" which is the subject of the above controversy. See Father Clarke's answer to Father Conway, "The Possibles Revisited: A Reply," *New Scholasticism*, XXXIV (1960), 79-102.

[7]Martin Grabmann, "Johannes Capreolus, O.P., der 'Princeps Thomistarum' (d. 7 April 1444) und seine Stellung in der Geschichte der Thomistenschule," *Divus Thomas* (Fribourg), XXII (1944), 85-109 and 145-70; Johannes Hegyi, S.J., *Die Bedeutung des Seins bei den klassichen Kommentatoren des heiligen Thomas von Aquin: Capreolus, Silvester von Ferrara, Cajetan* (Pullach: Verlag Berchmanskolleg, 1959), pp. 9-15.

[8]*Defensiones Theologiae Divi Thomae Aquinatis*, ed. Paban-Pègues (7 vols. Turin: Alfred Cattier, 1900). To facilitate reference, volume, page, and column will be indicated.

[9]A. Krempel, *La doctrine de la relation chez Saint Thomas* (Paris: J. Vrin, 1952), p. 30.

[10]*Def. Theol.*, Vol. I, p. 1a. It is noteworthy that a change in the structure of the traditional *quaestio* has taken place. Instead of a *respondeo* wherein the resolution of the question takes place, the conclusion is posited initially and arguments are then marshalled in its defense. This would seem to indicate that Capreolus is not so much establishing his positions but defending positions which are to him a philosophical heritage. And that this should alter the basic structure of the *quaestio* is only natural.

Moreover, that this method of Capreolus's will offer difficulty for anyone attempting to divine his interpretation of the text or texts of St. Thomas will become all too apparent as we proceed. Note the lament of J. Hegyi: "Wie ist es aber unter diesen Verhältnissen möglich, die persönliche Meinung des Capreolus herauszuarbeiten?" (*Bedeutung des Seins*, p. 14).

For an indication of Capreolus's appreciation of the *Summa Theologiae* of St. Thomas in relation to the latter's *Scriptum* and other works, see *Def. Theol.*, Vol. IV, p. 38a. For Capreolus, ". . . *Summa* est quasi liber retractationum . . ." Reference to this text as well as to others in the same vein will be found in M. Grabmann, "Johannes Capreolus, O.P.," pp. 95-97; J. Hegyi, *Bedeutung des Seins*, pp. 14-15.

[11]*Def. Theol.*, *In I Sent.*, d. 8, q. 1, a. 1, Vol. I, p. 301b. The way in which Capreolus chooses to pose the question is historically significant. For he has asked, "Utrum creatura subsistens sit suum esse existentiae?" This manner of posing the question is reminiscent of the Avicennian tradition embodied in

By way of an over-all appreciation of Capreolus's purpose in writing his work we are fortunate in having his own description of his task. It is his avowed purpose to put forth nothing of his own but to reproduce the positions he thinks are according to the mind of St. Thomas. With rare exceptions, moreover, he intends to use St. Thomas's own words in proof of any conclusions. The same method of using St. Thomas's own words is to be used in solving the objections of the opponents of St. Thomas.[10]

The section of Capreolus's work most suitable for achieving the purposes of this paper (and incidentally for seeing a concrete application of his method of defending St. Thomas by using St. Thomas) is the place where he raises the question of the distinction between essence and existence.[11] His treatment of such a question is rather elaborate, including the citation of numerous authorities who deny that a subsisting creature is its own *esse existentiae* and one argument *in oppositum*,[12] the purpose of all of this being to introduce five distinct

Henry of Ghent and others, and is not the terminology of Capreolus's avowed master, St. Thomas. On this see Joseph Owens, C.SS.R., "The Number of Terms in the Suarezian discussion on Essence and Being," THE MODERN SCHOOLMAN, XXXIV (1957), 152, n. 17; 160, n. 30; and C. Fabro, "L'Obscurcissement de l'*esse*," *passim*. Note also Father Owens in *St. Thomas and the Future of Metaphysics*, p. 83, n. 39; p. 86, n. 40.

[12] *Def. Theol.*, Vol. I, p. 301b. A striking similarity in the citation of authorities on this question is found in Petrus Aureolus, *Scriptum super Primum Sententiarum*, I, d. 8, q. 21, ed. E. M. Buytaert (St. Bonaventure, N.Y.: Franciscan Institute, 1956), Vol. II, pp. 884-85. Capreolus's use of Aureolus's commentary has been noted by Capreolus's editors (p. xxii). This is certainly the case with the *Argumenta Godofridi* (Godfrey of Fontaine), which Capreolus lists as contrary to his first conclusion (*Def. Theol.*, Vol. I, p 317ab). Aureolus's rendition of some arguments of Godfrey may be found, *Scriptum super I Sent.*, ed. Buytaert, pp. 889-90. Morevover, in addition to using Aureolus as a source for the positions of the adversaries of St. Thomas, Capreolus also uses Aureolus as a source of arguments against some of their mutual opponents. For, in answering *argumenta aliorum*, one of whom seems to be Henry of Ghent, Capreolus notes: ". . . immo videtur implicari contradictio in dictis istorum, ut probat unus alius Doctor . . ." (*Def. Theol.*, Vol. I, p. 330b). The latter is Aureolus arguing against Henry of Ghent. Cf. Aureolus, *Scriptum super I Sent.*, Vol. II, p. 904, no. 75.

The argument in oppositum noted at the outset of this note is quoted by Capreolus again as the ninth argument of Godfrey of Fontaine (*Def. Theol.*, Vol. I, p. 317b), but in reality it is an argument of Aureolus against the real distinction between essence and existence (*Scriptum super I Sent.*, Vol. II, p. 898).

Capreolus, in his answer (*ibid.*, Vol. I, p. 327a) notes that ". . . major a multis multipliciter glossetur . . ." which seems to indicate that it was a much discussed argument.

conclusions bolstered by suitable arguments.[13] This constitutes the first article. The second article contains the arguments of the adversaries of the foregoing conclusions and Capreolus's answer to them.[14]

[13]The following conclusions are stated. 1. "Prima conclusio: Nulla creatura subsistens est suum esse quo actu exsistit in rerum natura." 2. "Secunda conclusio principalis hujus articuli est ista: Quod esse creaturae non sic se habet ad illud quod est, vel ad quidditatem creaturae, omnino consimiliter sicut forma substantialis ad materiam." 3. "Tertia conclusio est quod esse exsistentiae non se habet omnino similiter ad substantiam vel essentiam creaturae sicut accidens ad subjectum, accipiendo accidens proprio pro quidditate accidentali reposita in aliquo novem generum accidentis." 4. "Quarta conclusio est quod esse creaturae, quo formaliter est actu, non est Deus, nec est proprie creatura, nec est proprie ens vel quod est." 5. "Quinta conclusio est quod aliquod esse est ipsa essentia creaturae, aliquod vero esse est actualitas ejus, et aliquod esse non est hoc nec illud" (*ibid.*, Vol. I, pp. 301, 312-14).

[14]"In hac quaestione erunt duo articuli. In primo quorum ponentur conclusiones. In secundo vero, adversariorum objectiones" (*ibid.*, Vol. I, p. 301). As a rule Capreolus divides the *objectiones* of his adversaries and his own *solutiones* according as they concern each of his conclusions. But in this instance Capreolus cites only the arguments against his first conclusion.

[15]*Ibid.*, Vol. I, pp. 301a, 305b, 306a, 307b, 308b, 310b. On the basis of the sixth argument Capreolus derives a very brief *novum argumentum*. With the exception of the sixth and seventh arguments, each argumentation takes its point of departure from a text of St. Thomas from the *Summa contra Gentiles*, II, cap. 52. The sixth argument uses a text from St. Thomas's *Commentary on the Sentences* and the seventh cites his second *Quodlibet*. In each case, the text of St. Thomas is followed by an argument in opposition which Capreolus will answer.

[16]From a remark of T. Pègues, "La biographie de Jean Capréolus," *Revue Thomiste*, VII (1899), 330, I gather that I am not the first to make this remark; nor need it be taken in a derogatory sense, for a mosaic can be and often is a work of high artistic quality. Indeed, Capreolus's synthesis is all of a piece rather than being an artificial juxtaposition of texts, for these citations are quickened from within by that very personal existence which the intelligibility of such texts have in the mind of Capreolus.

[17]This text as cited by Capreolus reads slightly differently in its Leonine edition. See *Summa contra Gentiles*, II, cap. 52 (ed. Leonine Manual [Rome, 1934], p. 145b). I think that the substance of this text is to be found in St. Thomas's *De Ente et Essentia*, cap. 4 (ed. Roland-Gosselin, p. 35), where the context is the same as in *Contra Gentiles*, II, cap. 52—essence and *esse* in the separate substances. This is reiterated in *Summa Theologiae*, I, q. 3, a. 4 (Ottawa, I, 18a-19b). Even the classical text *In IV Metaphys.*, lect. 2 (Cathala, No. 558) avows the same position: "Esse enim rei quamvis sit aliud ab ejus essentia, non tamen est intelligendum quod sit aliquod superadditum ad modum accidentis, sed quasi constituitur per principia essentia." All agree in stressing the formal causality of essence and either indicate, as the first three, or imply, as the last one, that the *esse* is due to an efficient cause. The analogy of light, air, and sun, apparently inspired by St. Augustine, is used frequently by St. Thomas to describe the relation of God and creature. See *ST*, I, q. 104, a. 1c, and especially ad 1, (Ottawa, I, 623a-b); *De Ver.*, q. 5, a. 2 ad 6 (ed. R. Spiazzi in *Quaest. Disp.* [Turin: Marietti; 1949], I, 93); *In III Sent.*, d. 6, q. 2, a. 2 resp. (ed. Moos, III, 238); *Contra Gentiles*, II, cap. 54 (ed. Leonine, XIII,

Of interest to us here is Capreolus's defense of his first conclusion, that no subsisting creature is its own *esse*, the act by which it exists in reality. More especially, since he proves this conclusion with no less than six lengthy arguments,[15] our concern is with his first argument as this is relevant to the tradition criticized by Father Clarke and alluded to by Father Conway.

At first glance Capreolus's first argument is a rather elaborate mosaic[16] of authoritative texts, each purportedly complementing one another and, unfortunately, with but sparse commentary on the part of Capreolus; this last is offered by way of replies to objections. For example, four explicit texts of St. Thomas are cited, only one of which is explicitly concerned with essence and existence. St. Albert, Aristotle, Robert Grosseteste, St. Augustine, and Averroes come in for one or more citations. The difficulty that such a mosaic offers to any analysis is obvious. But when Capreolus literally hides behind his authorities and gives but sparingly of his commentary, the difficulties of analysis are appreciably enhanced. Still, to grasp in some way that personal existence which these texts have in the mind of Capreolus, we must lift each piece out of its setting, scrutinize it carefully, and replace it again within the complete design of the whole.

The first text cited by Capreolus is that of St. Thomas: "Substantia uniuscujusque est ei per se, et non per aliud; unde esse lucidum actu non est de substantia aeris, quia est ei per aliud. Sed cujuslibet rei creatae esse est ei per aliud; nam alias non esset creatum. Nullius igitur substantiae creatae suum esse est sua essentia."[17] This terse

392a, 20-25). From an analysis of such texts, Father Owens, in *St. Thomas and the Future of Metaphysics*, p. 90, n. 47, notes: "This comparison shows clearly how St. Thomas conceives the principles of the essence as causing being only in the line of formal causality, and even then presupposing the efficient causality of the agent." And he also notes in "The Accidental and Essential Character of Being in the Doctrine of St. Thomas Aquinas," *Mediaeval Studies*, XX (1959), 21: "The only conceivable way in which this doctrine can make sense is to regard being as somehow prior to essence. If being were subsequent to essence it would be a predicamental accident."

It is interesting to note that Capreolus cites the text of St. Thomas from *In IV Metaphys.*, lect. 2 (Cathala, No. 558) on behalf of this third conclusion (*Def. Theol.*, Vol. I, pp. 313-14). He alludes to it again in answering the twelfth argument of Aureolus (*Def. Theol.*, Vol. I, p. 330a).

Just how Capreolus understands this formal constitution is alluded to in his answer to the third argument of Gerard of Carmel (*ibid.*, Vol. I, p. 322a). Further clarification can be found in the

and cryptic text is but one argument of St. Thomas within the larger context of other arguments, all purporting to show that *esse* and *quod est* are not identical in the angels (*in substantiis intellectualibus creatis*). Thus, it is certainly relevant to the initial conclusion put forth by Capreolus. As to content, it is important to realize that the stress and major emphasis is laid on *esse* and its *per aliud* characterization. For a contrast is established between the substance or essence of a thing which belongs to a being *per se et non per aliud* and the *esse* of any created thing which belongs to such a being *per aliud*. In the same way *esse lucidum actu* does not belong to air *per se* but is present to it *per aliud*. Hence, it is indicated that *esse* is not the essence or an essential attribute, but accrues to a being from something outside the essence (*per aliud*). If such were not the case, it would not be a creature. The terms in need of clarification are St. Thomas's use of *per se* and *per aliud*. They would seem to indicate, by reason of the use of *per*, a contrast of causal relationships, one intrinsic, *per se*, and the other extrinsic, *per aliud*. That is, *per se* indicates an intrinsic formal cause and *per aliud* indicates an extrinsic efficient cause.[18] The

answer to the sixth argument of Godfrey of Fontaine (*ibid.*, Vol. I, p. 317a and p. 326a) which does not belong to Godfrey at all but is an argument of Aureolus *in oppositum* the arguments for a real distinction between essence and existence (*In I Sent.*, d. 8, q. 21 [ed. Buytaert, II, 891, no. 35]).

[18]"Esse creatum non est per aliquid aliud, si ly 'per' dicat causam formalem intrinsecam; immo ipso formaliter est creatura; si autem dicat causam formalem extra rem vel causam effectivam, sic est per divinam esse et non per se" (*In I Sent.*, d. 8, q. 1, a. 2 ad 2 [ed. Moos, I, 198]).

The *ab alio* characterization of *esse* in the *De Ente* text cited in the preceding note also is indicative that *esse* is *per aliud*: ". . . istae prepositiones 'a' et 'per', in hoc differunt; quia 'a' designat tantum habitudinem principii per modum efficientis; sed 'per' designat habitudinem principii secundum quodlibet genus causae; unde omne illud quod est ab aliquo est per illud: sed non convertitur" (*In I Sent.*, d. 32, q. 2, a. 2, sol. 1 [ed. Moss, I, 754]).

For Capreolus *per se* indicates an exclusion of the many ways in which a thing can be said to be *per aliud*: "Ad primum (Henrici) quidem, quod ly per se potest excludere tamquam subjectum vel receptivum; et tunc conceditur quod aliquod creatum est ens per se; sicut substantia, quae non est ens per aliud susceptivum, et ideo dicitur ens per se. Linconiensis, 1. *Poster.*, cap. 4, dicit: 'Dicitur autem per se esse quod per efficientem causam non est; sic sola prima causa per se est. Dicitur secundo per se esse quod per causam materialem non est; et sic dicuntur intelligentiae per se entes vel per se stantes. Dicitur etiam per se esse quod per subjectum non est; et sic dicitur omnis substantia et sola per se esse.'—Haec ille.

"Alio modo, ly per se potest excludere per aliud tamquam formale; et sic, nec essentia substantiae, nec accidentis essentia, est ens per se; sed per aliud formaliter, scilicet per esse; et hoc, loquendo de ly ens prout est participium et significat tantum quantum hoc quod dico exsistens. Isto modo enim quaelibet essentia creata est ens

reason why air is air—to enlarge upon St. Thomas's example—and is endowed with its essential characteristics is not explained by something extrinsic to the essence (*et non per aliud*). It is explained by the essence itself—*per se*. The reason why air is, or is actually illumined, is not due to the essence and is not an essential attribute but is explained by something extrinsic to the essence—*per aliud*. In short, beings manifest the presence of an intrinsic formal cause and the presence of an extrinsic efficient cause. Each performs its own task in its own order of causality, contributing to the ultimate constitution of the concrete existent, the composite of essence and existence. But, granted that *per se* indicates an intrinsic formal cause, does such an expression explicitly deny, with respect to the essence or substance of a thing, that the essence comes to be by an intrinsic efficient cause? Does such an expression positively exclude the essences of creatures from any and all impact of an efficient cause such that the *per se* character of essence persists apart from *esse*? Does *per se* mean that the essences of creatures are so impervious to an efficient cause that they are radically uncreated and only their *esse* is truly created?[19]

per aliud et non per se, prout ly per se excludit formale, et non solum susceptivum illius quod est."

[19]I think St. Thomas's own position on the question of an uncreated essence is clear, for he posed the very question to himself and answered it: "Omnia quae a Deo sunt facta, dicuntur esse Dei creaturae. Creatio autem terminatur ad esse; prima enim rerum creatarum est esse, ut habetur in libro *de Causis*. Cum igitur quidditas rei sit praeter esse ipsius, videtur quod quidditas rei non sit a Deo" (*De Pot.*, q. 3, a. 5, obj. 2 [Turin: Marietti, 1953; II, 48]).

St. Thomas replies: "Ex hoc ipso quod quidditati esse tribuitur, non solum esse, sed ipsa quidditas creari dicitur; quia, antequam esse habeat, nihil est, nisi forte in intellectu creantis, ubi non est creatura, sed creatrix essentia." See also St. Thomas's reply *ibid.*, a. 1 ad 17 (II, 41).

That the objection should quote the *Liber de Causis* in defense of its position offers an interesting parallel with Capreolus's citation of St. Albert's commentary on this same work (*Def. Theol.*, Vol. I, p. 302 ab). In each case the doctrine of an uncreated essence is concluded. Moreover, it is still more interesting that this argument finds its proper context in the world of Avicennian thought. Cf. Beatrice Zedler, "St. Thomas and Avicenna in the *De Potentia Dei*," *Traditio*, VI (1948), 105-9 and Gerard Smith, s.j., "Avicenna and the Possibles," *New Scholasticism*, XVII (1943), 340-57, where on page 349 it is noted: "Here it is pertinent to sharpen St. Thomas' point by asking, Exactly what is the status of that-which-can-be in relation to God? The answer might be indicated in this way: St. Thomas cannot even be asked the question. Avicenna can be asked, and we have seen his answer: a possible is a datum, given to, but not by, God; he cheerfully but necessarily wills it into existence. St. Thomas' possible being, however, is not a buffer state between existents and God. What indeed could

Capreolus, for the moment, does not immediately confront such questions. For, in lieu of a direct explanatory comment of his own, he complements this text with a lengthy citation from St. Albert, since the latter argues in a manner similar to St. Thomas.[20] In this text

this buffer state be, which is without existence and yet is not God? Hence, the question cannot be asked, because there is nothing to ask it about." We shall have occasion later to indicate that Capreolus knows the *De Potentia* text of St. Thomas but glosses it in a very unusual fashion. For now let it be noted that Capreolus is also aware of a variation on the objection in the *De Potentia* which utilizes the same text of the *Liber de Causis*. It is an argument cited by Aureolus on behalf of the real distinction between essence and existence, as the tradition ". . . Avicennae et Thomae et Aegidii et plurium aliorum . . ." which Capreolus certainly knows (see n. 12 *supra*): "Praeterea, quandocumque aliqua realis actio terminatur ad aliquid et non terminatur ad aliud, illa non possunt poni eadem res. Si enim sunt eadem res, quacumque actione reali unum attingitur et reliquum. Sed creatio est realis productio. Non attingit autem essentiam, quia Deus non facit hominem esse hominem aut esse essentiam, sed facit hominem esse et essentiam esse, secundum quod dicit auctor *De causis* in quarta propositione quod 'prima rerum causatarum est esse'. Ergo non sunt idem realiter essentia et esse" (*In I Sent.*, d. 8, q. 21 [ed. Buytaert, II, 886, no. 12]). What we seem to be confronting here is what Gilson notes: "The metaphysical complex resulting from the combination of Avicenna's notion of efficient causality as origin of existences, with the Proclean universe described in the *Book on Causes*, will become very common about the end of the thirteenth century" (*History of Christian Philosophy in the Middle Ages* [N.Y.: Random House, 1955], p. 211). To this must be added Gilson's further comment: "Il était assurément plus difficile, au début du XIVe siècle, de distinguer entre la position d'Avicenne et celle de saint Thomas sur la composition d'essence et d'acte d'être, que ce ne l'est aujourd'hui pour nous . . ." (*Jean Duns Scot* [Paris: Vrin, 1952], p. 487, n. 1).

[20] *De Causis et Processu Universitatis*, I, 1, 8 (ed. A. Borgnet, [Paris: 1890-99], X, 377). As Capreolus quotes this text it reads differently and seems to make better philosophical sense than both the Borgnet and the Jammy readings: "Omne quod ex alio est, aliud habet esse, et hoc quod est. Quod enim animal sit animal, vel homo sit homo, pro certo, non habet ex alio; hoc enim aequaliter est, homine exsistente, et homine non exsistente secundum actum. Quod autem esse habeat in effectu, ex se non est sibi, sed potius ex primo esse, ex quo fluit omne esse quod est in effectu. Hoc igitur quod est ab alio, habet esse et illud quod est; et sic esse hoc modo accidit ei, quia ab alio sibi est. Et ideo in ipso quaeri potest, an est, an non est; et est quaestio determinabilis per causam ejus quod est esse. In primo autem principio, propter hoc quod esse non habet ab alio, esse per se est; et quaestio, an est, nullum locum habet. Et si quaeratur, hoc erit secundum solam distinctionem rationis, et determinari non potest; hoc enim quod ipsum est et esse suum unum est . . . Cum ergo dico, homo est homo, propter hoc verum est, quia ibi dicitur illud quod est de eo quod est; et sic est id quod est non per aliquid aliud quod influat super ipsum. Patet ergo quod omne quod est, id quod est habet a seipso; esse autem suum in effectu, si ex nihilo est, a seipso habere non potest. Si enim a seipso haberet, cum sit ex nihilo, in nihilo non esset in potentia ad esse; homo enim non est in potentia illud quod est; et si esse a se haberet, oporteret quod homo exsistens in potentia haberet esse in effectu. Sequitur ergo quod homo exsistens in potentia haberet esse in effectu; et sic idem esset in effectu, et

St. Albert is concerned with manifesting what it means for something to be called *primum principium*. In the section quoted by Capreolus a contrast is set up between the *primum principium* and everything else. St. Albert indicates that everything *ex alio* is composed of *esse* and *hoc quod est*. However, the *hoc quod est* is not *ex alio*. That is, that animal is animal or man is man is not *ex alio*, for man is man whether any man exists or not. On the other hand, *esse* or *esse in effectu* is *ex alio*; that is, from the first *esse*, *ex quo fluit omne esse quod est in effectu*. Thus, St. Albert says that *esse hoc modo accidit ei quia ab alio sibi est*. In the case of the *primum principium*, *hoc quod ipsum est* and *suum esse* are one. And if one were to venture that every *quod est*, in addition to having *id quod est a seipso* has *esse a seipso*—that is, that they are identified— a contradiction would follow. For since a creature is *ex nihilo*, if it has *esse a seipso* it would

non esset in effectu. Ab alio ergo habet esse; a seipso autem quod sit hoc quod est; et per consequens esse non est hoc quod est. Et hoc est quod dicit Boetius, in libro *de Hebdomadibus* (Hebdom. 4): *Quod est habere aliquid potest praeter illud quod ipsum est; esse vero nihil habet admixtum . . .*"

Let us say initially that the presence of Avicenna to this text has not gone unnoticed by historians of this question, as witnessed by A. Maurer, "*Esse* and *Essentia* in the Metaphysics of Siger of Brabant," *Mediaeval Studies*, VIII (1946), 75; J. de Finance, *Etre et agir dans la philosophie de saint Thomas* (Paris, Beauchesne), p. 93; M.-D. Roland-Gosselin, *Le "De Ente et Essentia" de S. Thomas d'Aquin* (Paris, Vrin), p. 178. If this is the case with the text of St. Albert, Avicenna's presence to the thought of Capreolus must be evaluated in the final analysis, for Avicenna was cited on behalf of Capreolus's first conclusion (see *supra*, n. 12). In addition, Avicenna, on the distinction between essence and existence, is cited approvingly in Capreolus's answer to Gerad of Carmel: "Utrum autem distinguatur ab eo quod est et subsistit, habetur partim ab eo (Aristotle), 2. *Posteriorum*, ubi Supra (cap. 4, t. c. 7) allegatum est, et partim a eius discipulis, puta Avicenna, Alpharabo, Algazele, Boetio, Auctore *de Causis*, et a sanctis Doctoribus" (*Def. Theol.*, Vol. I, p. 322ab). He is cited again in Capreolus's answer to Aureolus: "Non enim est verum quod omnis essentia sit quaedam actualitas in genere exsistentium, quidquid sit de genere entium praedicamentalium; omnis enim essentia creata est in potentia ad actualitatem essendi, ut probat Avicenna, ex hoc quod habet actum exsistendi ab alio; modo nihil est in potentia ad seipsum" (*ibid.*, p. 329a). It must also be noted that Capreolus is aware of a difference between the position of Avicenna on the distinction between essence and existence and the position of St. Thomas on the same question (*ibid.*, p. 330a).

Now, since the text of St. Albert is complementary, at least for Capreolus, to the text cited from St. Thomas, it amounts to a commentary on St. Thomas's argument and helps to clarify the way in which Capreolus understands that short cryptic argument of St. Thomas.

not be in potency to *esse*, inasmuch as man is not in potency to *illud quod est* with which the *esse* is supposedly identified. But as *ex nihilo* it must be in potency to *esse*. Thus, man existing in potency would have *esse in effectu*—a case of the same thing being in act and potency at the same time with respect to the same thing.[21]

In Capreolus's mind, then, St. Albert's text serves as a commentary

[21]At this point the Borgnet text (see *supra*, n. 20) reads differently. This reading insists that "homo enim in potentia est hoc quod est." Capreolus's text affirms that "homo enim non est in potentia illud quod est."[2] Both text traditions, however, reach the same conclusion. I suspect that the reading of Capreolus is closest doctrinally to the thought of St. Albert in this place.

[22]"Dicetur, forte, quod ista ratio non concludit, quia supponit falsum in majori, scilicet quod essentia rei insit ei per se, hoc est, sine alia causa efficiente. Hoc enim negatur; quia, sicut homo habet a causa efficiente quod exsistat, vel quod sit in actu, ita a causa habet quod sit homo, et non per se, hoc est sine alia causa. Unde, sicut ante mundi creationem homo non exsistebat, ita nec erat homo; et ista erat falsa: homo est homo" (*Def. Theol.*, Vol. I, p. 302b). The similarity of this objection to Siger of Brabant's opposition to St. Albert is striking. In discussing the question "Utrum Esse in Causatis Pertineat Ad Essentiam Causatorum" (*Siger de Brabant, Questions sur la métaphysique*, ed. C. A. Graiff, [Louvain, 1948], pp. 11-22), Siger has occasion to note an equivocation in both the position of St. Albert in his commentary on the *Liber de Causis* and in the position of Avicenna in their use of *ex* and *per* (*ibid.*, pp. 14-15). Siger is aware that for both of them to say that the essence of a being is *ex se* or *per se* means apart from an efficient cause. Such is not the case for Siger: "Dicendum quod hic est aequivocatio ex eo quod 'ex' importat circumstantiam causae, et causa multipliciter dicitur, ut habetur *V° Metaphysicae*, et Avicenna deceptus fuit per aequivocationem de ly 'ex'. Cum enim dicitur res est ex seipsa, potest 'ex' denotare circumstantiam causae formalis vel efficientis. Tunc dico quod ista simul stant: homo est homo per se, secundum quod ly 'per' dicit circumstantiam causae formalis; et tamen homo per aliud est homo secundum quod 'per' denotat circumstantiam causae efficientis, et sic est deceptio. Unde in libro *Posteriorum*: primo modo dicendi per se illud est tale quod est tale per suam formam: unde potest aliquod causatum esse per se formaliter, et tamen causam efficientem habet aliam."

Siger again opposes St. Albert in "Quaestio utrum haec sit vera: Homo est animal nullo homine existente?" in *Siger de Brabant et l'averroïsme latin au XIII^e siècle*, ed. P. Mandonnet (2d ed.; Louvain, 1911), Part II, pp. 65-70. Let it be noted that the reason for Siger's opposition to St. Albert on this latter question is that the possibility of no man existing in an eternal world is an absurdity (*ibid.*, Part I, p. 118), which does not seem to be the case of the objector in Capreolus. Yet the common denominator between Siger and this anonymous objector is this, that they both assert an existentialized essence subject to an efficient cause. On Siger's opposition to St. Albert, see A. Maurer, "*Esse* and *Essentia* in the Metaphysics of Siger of Brabant," *Mediaeval Studies*, VIII (1946), 68-86. (esp. 76). If the contention is made that in the text cited from the *De Causis et Processu Universitatis* St. Albert is merely the commentator on Aristotle and not committing himself personally in regard to the truth or falsity of the doctrine (II, 5, 24; [X, 619]), then the same doctrinal immunity cannot be valid for Capreolus in citing St. Albert's commentary, for there is no evidence that he is merely a commentator in the manner of St. Albert. Rather, he is a defender.

on the text of St. Thomas. Whereas St. Thomas sets off a creature's essence and its *esse* by contrasting the *per se* character of the one with the *per aliud* character of the other, St. Albert makes use of *a seipso* in regard to the essence and *ab alio* in reference to *esse*. For St. Albert, these terms point up, first, that a thing is what it is in virtue of itself and, secondly, that the fact that it is, is due to an extrinsic agent. On the surface this text purports to say much the same as St. Thomas's text. However, in St. Albert's text, unlike St. Thomas's, it is quite explicit that the *per se* or *a seipso* character of essence or *id quod est* persists and is operative apart from *esse* and apart from any efficient cause. *A seipso*, then, positively excludes any and all penetration of an efficient cause. This is the sense of *per se* that Capreolus would have his reader take from the text of St. Thomas—essence has a being of its own, altogether independently of an efficient cause.

But again Capreolus fails to corroborate directly this interpretation as being his own understanding of St. Albert's text. Rather than such a confrontation, he chooses to interpose a possible criticism of the position set down in the two prior citations.[22] Though there is still no direct comment on Capreolus's part, the objection and his reply to it furnish us with an evident indication of his own interpretation of the two above-mentioned passages. Indeed, this objection affords the key to Capreolus's interpretation of these two texts and also the key to the pattern of Capreolus's subsequent response.

In the mind of the objector, the argument contained in the two citations is inconclusive. For the objector denies as false the supposition of the perseity of the essence of a thing in the sense that it belongs to a thing independently of an efficient cause. Just as man *exists* in virtue of an efficient cause, so too man is *a man* in virtue of such a cause. So much is this a fact that, prior to the creation of the world and in the absence of the creature known as man, it was false to say "Homo est homo."

This nameless adversary has confronted the use of *per se* and *a seipso* in the texts of St. Albert and St. Thomas wherein St. Albert's doctrine of an essence, radically independent of an efficient cause, is dominant. The burden of the whole rejoinder bears on the existential order of efficient cause and shows how the requirements of this existential order

assert themselves within, and have repercussions on, the essential order, the order of *per se* predication.

Again a direct retort of Capreolus is lacking. He prefers to chide his adversary for being ignorant of certain authoritative texts such as those of Aristotle commented upon by Robert Grosseteste.[23] This time, however, Capreolus affords his reader an explicit commentary of his own. The texts of Aristotle as glossed by Grosseteste indicate that every proposition in the first and second mode of predicating *per se* is necessary and perpetually true. The quiddity of a rose necessarily belongs to a rose because the proposition "Rosa est rosa" is the first type of essential predication. The rose cannot be otherwise than a rose. Further, Capreolus explicitly indicates that the quiddity of a rose does not belong to it *per aliquam causam agentem extrinsecam.* There is no efficient cause that a rose is a rose. This last is based on further citations of Grosseteste's commentary.[24]

[23]"Sed qui sic dicit non advertit quod dicit Aristotles, 1. *Posteriorum*, cap. 6 (t. c. 15), secundum signationem Linconiensis . . . et cap. 7 (t. c. 21)" (*Def. Theol.*, Vol. I, p. 302b). The texts of Aristotle which are cited constitute the lemma cited by Grosseteste prior to his commentary. Thus all the texts come from Grosseteste. See Robert Grosseteste, *In Aristotelis Posteriorum Analecticorum Libros* (Venetiis, 1537), I, 6, fol. 6va *et seq.*

[24]"Ex quibus patet quod omnis propositio de primo modo dicendi per se, et de secundo, est necessaria et perpetuae veritatis. Cum ergo quidditas rosae conveniat rosae in primo modo dicendi per se, sequitur quod necessario convenit ei. Quod etiam quidditas rosae non conveniat ipsi rosae per aliquam causam agentem extrinsecam, ita quod aliqua causa efficiens sit causa quod rosa sit rosa, ostendit Linconiensis. Unde, primo *Posteriorum*, commento 4 . . . et commento 7 . . ." (*Def. Theol.*, Vol. I, p. 303a). For Capreolus, then, *per se* has a positive and negative aspect. Positively it denotes the characteristics of necessity and perpetuity or eternity; negatively it designates the absence of any relation to an efficient cause. Capreolus's citation of Grosseteste here on behalf of his position presents a problem, for in none of his texts cited does Grosseteste say explicitly that there is no efficient cause of the essences of things. Capreolus does quote him as saying, "Hoc ipsum quod dico, per se, causam comparticipem excludit" (*ibid.*), which may or may not substantiate Capreolus's contention. However, when one goes to the context in Grosseteste himself, the doctrine is clear. What Capreolus has done is to cite this first sentence of Grosseteste's commentary, then suppress a section of it with the words "et aliquibus interpositis subdit," and pick up the same text again farther on. The suppressed section is as follows: "Dicitur autem 'per se' esse quod per efficientem causam non est, et sic sola causa prima est per se. Dicitur secundo 'per se' quod per causam materialem non est, et sic dicuntur intelligentiae per se entes, vel per se stantes. Dicitur etiam 'per se' esse quod per subjectum non est, et sic dicitur omnis substantia et sola per se esse . . ." (*In Aristotelis*, I, 4, fol. 4va). Now, at least, we can see what Capreolus's citation means. For it is true that *per se* in one sense does signify the exclusion of an efficient cause; but it has meaning only in regard to the first cause—"et sic sola causa prima est per se"—and does not apply to the creature or the essence of

Capreolus is clearly taking his cue from the previously cited text of St. Albert. There it was noted that there is no cause of "Man is man" or "Animal is animal," each of which is true whether man or animal is existing or not, for the truth of each arises, not from the prior existence of man or animal, but rather from the fact that *illud quod est* is said of *illud quod est.* Instead of meeting the force of his adversary's attack on the existential level of the efficient cause, Capreolus meets him on the essential level of *per se* predication. For the adversary in keeping with his rejection of *per se* as signifying the radical absence of an efficient cause, had stated as a corollary to his stand that the proposition "Homo est homo" is false if no man exists. In the first phase of his rebuttal, Capreolus prefers to confront this by drawing out the implications of *per se* predication. Thus he can say that such propositions are necessary and perpetually true. At this

the creature. What makes it worse is that Capreolus is fully cognizant of the deleted section, for he quotes it in full when he replies to the first objection of Henry of Ghent (*Def. Theol.*, Vol. I, p. 321a).

The continuation of this same text which Capreolus has cited poses a further difficulty. "Est autem per se alterum de altero. Et dicitur per se alterum de altero, cum quidditas unius essentialiter, et non per accidens, a quidditate alterius egreditur. Illud autem cujus quidditas essentialiter et non per accidens a quidditate alterius egreditur, esse suum habet ab eo a quo egreditur, sicut a sua causa efficiente, vel materiali, vel formali, vel finali. Illud autem a quo habetur esse necesse est ut recipiatur in diffinitione quae dicit quid est, vel quid est esse. Per se igitur dicitur et est alterum de altero, cum unum recipit reliquum in sua diffinitione." The question is, what does this *esse* mean here in the context of definition and quidditative relationships? Has it an existential connotation? Is it the Boethian *esse* denoting the specific essence? Or is it the Aristotelean *quod quid erat esse*? It seems clear that it is either one of the latter two. If one goes again to the text of Grosseteste, he will see that, in the large section of the text which Capreolus fails to cite, Grosseteste goes on to talk of genus, difference, and species, indicating that this is what he had in mind initially, in the first part of the reference actually cited by Capreolus. For the text continues: "Cum igitur genus vel differentia subalternata a quibus subalternaliter, et non per accidens, egreditur quidditas speciei, praedicatur de specie, est primus modus essendi vel dicendi per se alterum de altero, egreditur namque species a quidditate generis, differentiae, et est differentia causa formalis speciei, et genus est causa speciei, sicut forma materialis, vel sicut materia formalis et istum sermonem alias confirmabimus ratione et auctoritate" (*In Aristotelis*, I, 4, fol. 4va). Thus it seems certain that Grosseteste is talking in the formal order or in the order of formal causality. And this is the case with the last text of Grosseteste cited by Capreolus where he says: ". . . ita quod in utraque propositione subjectum est praecisa causa praedicati vel e converso." For the *esse* in question is a quidditative *esse*.

point the first phase of his answer shifts and blends into a second phase when he says that, as for an efficient cause of the quiddity, Grosseteste shows that there is no such thing. With the initial assault on the essential level secured, Capreolus realizes he must counter the existential portion of his adversary's argument in regard to efficient causality. Such an approach constitutes a complete reversal of his opponent's position. With the latter, the essential order of *per se* predication was subject to, and dependent upon, the demands and requirements of the existential order. Thus he could say that "Homo est homo" is not true because the existential prerequisite for such a

[25]"Sed ad ista dicetur dupliciter. Primo, quod tales propositiones, de primo vel secundo modo dicendi per se, non sunt necessariae nisi sub conditione; utpote, ista est necessaria, homo est animal, ad hunc sensum quod, si homo est, homo est animal; non autem absolute" (*Def. Theol.*, Vol. I, p. 321a).

[26]"Nec potest dici quod intendat talia esse necessaria ex suppositione vel conditionaliter; puta, posita constantia . . . subjecti talium propositionum . . . Similiter, sequitur quod verba Augustini sunt plus falsitatis quam veritatis . . ." (*ibid.*, pp. 303b-304a). The texts of St. Augustine cited are from *De Libero Arbitrio*, II, 8 and 10 (*PL* XXXII, 1252-53, 1256-57). For background on the problem of necessary truths *posita constantia subjecti* to which Capreolus alludes, see J. Isaac, *Le "Peri Hermeneias" en Occident de Boèce à Saint Thomas. Histoire littéraire d'un traité d'Aristote* (Paris: Vrin, 1953), Appendix III, p. 175, where he notes a proposition condemned by Robert Kilwardby at Oxford in 1277: "Item quod veritas cum necessitate tantum est cum constancia subjecti."

[27]"Et ideo dico quod homo semper est homo; et ista est immutabiliter vera: homo est animal rationale; et ejus veritas aeternaliter est in divino intellectu . . ." (*Def. Theol.*, Vol. I, p. 321a). In defense of this contention Capreolus cites two texts of St. Thomas, "1 p., q. 10, art. 3, ad 3[um] et *de Veritate*, q. 1, art. 5, ad 7[um]," both of which maintain that eternal truths can only be in an eternal intellect. (Note Capreolus, *Ad argumenta aliorum, Def. Theol.*, Vol. I, p. 330ab: "Sed conceditur quod tam essentiam quam ipsum ejus esse, Deus aeternaliter intellexit; ac per hoc, quodlibet eorum fuit in Deo aeternaliter, ut intellectum in intelligente. Ex quo provenit quod aeternaliter rosa est rosa, rosa est essentia; sed non aeternaliter fuit, nec aeternaliter exsistebat.") Again, Capreolus finds St. Albert in agreement with St. Thomas ("Cui concordat Albertus in *Post praedicamentis*, 9 cap.") in a long text from St. Albert's *Liber de Praedicamentis*, Tract. VII, cap. 9. As with the first text cited of St. Albert, here we are in the Arabic tradition on the question: "Secundum, inquit, Avicennam, et Algazalem, et Alpharabum, et veritatem, quando praedicatum concipitur in ratione subjecti, talis propositio vera est, sive re exsistente sive re non exsistente. Sive enim homo sit, et animal, sive homo non sit nec animal, semper ista est vera: homo est animal; et: animal est vivum; et: vivum est substantia; ergo homo est substantia. Sed si ulterius inferatur: substantia est ens; ergo homo est ens, dicunt non sequitur; quia ens vel entia esse accidit homini et animali, et non per se clauditur in intellectu eorum. Cum enim dicitur: homo est animal, sufficit ad veritatem propositionis, substantialis ordinatio praedicati ad subjectum, Cum autem additur: animal est ens, quia ens non est de ratione animalis vel hominis, non est ibi ordo substantialis unius ad alterum" (ed. Borgnet, I, 289-90).

proposition and its truth is lacking—an existential man. Capreolus comes the other way around; that is, he begins in the essential order of *per se* predication, and what is present there acts as prerequisites for the existential order. Hence Capreolus can say that since a rose is necessarily a rose and since this is perpetually true, then these facts demand that there is no efficient cause of the essence. In short, he is arguing from essence to existence; that is, if this is what essence is, then existence must be such and such. In spite of the brevity of Capreolus's own explicit commentary, the main outlines of his own understanding of the text tradition he alleges is quite clear.

He continues to amplify it but in much the same disconcerting manner as heretofore. For he poses a twofold objection of a still nameless adversary and proceeds to answer it with quotations from St. Augustine, St. Thomas, St. Albert, and Aristotle, interspersed with only brief commentaries of his own. The adversary confronts the texts of Grosseteste on two counts. First, to the contention that *per se* propositions of the first and second type are necessary, the reply is made that they are not absolutely necessary. Rather they are conditionally necessary—*homo est animal* is necessary in the sense that if man exists *homo est animal*.[25]

Against the claim of conditional necessity, Capreolus charges that this destroys the necessary principles of the demonstrative sciences. That two and three are five, or seven and three are ten, would then be no more necessary and immutably true than such propositions as that the earth is and the heavens exist. Moreover, this is contrary to St. Augustine, who affirms such necessary, eternal, and incorruptible truths without qualifying them as conditionally or hypothetically necessary. Capreolus argues that, in terms of the adversary's doctrine, what St. Augustine had said is more false than true.[26] For this reason, Capreolus rejects the opposing position and insists that man is always man and that the proposition "Homo est animal rationale" is immutably true. Its truth is eternally in God's intellect.[27]

In saying so much as this, Capreolus has transferred the whole argument of his adversary to the domain of uncreated truth. It is interesting, thus, to note that, though starting out on the created level of reality to discuss the question of the identification of existence with

the creature, we have ended by exploring the divine intellect. The adversary has remained on the created or existential level by reason of his insistent demand that in order that man be man, man must first be. And he is on the created level when he remarks that man by himself is formally animal, yet he is not so by himself efficiently, for this intrinsic formal cause is created—that is, comes to be by an extrinsic efficient cause. Here one is not talking on the level of uncreated truths as they exist in the divine intellect; rather, the point is made on the level of created truth. But Capreolus, denying, as he does, an efficient cause of the essence, can posit essential propositions and their truth only in the divine intellect, if they are to be eternal, immutable, and necessary. He has to end in the divine intellect because he can end nowhere else, having cut himself off from any created essential order in favor of an order independent of efficient causality and impervious to any existential penetration. The necessary and the contingent are encapsulated each within its own domain. Indeed they are worlds apart.

But, in all fairness, the adversary did not say as Capreolus would

[28]"Sic ergo patet quod prima responsio non est nisi fuga, quae ponebat quod tam contingens est ista, rosa est rosa, sicut ista, rosa existit. Et procedit hoc, quia non discernitur de ly est, prout est secundum adjacens, et prout est tertium adjacens. Primo modo enim significat actualem exsistentiam subjecti; non autem secundo modo, sed solum veritatem subjecti et praedicati. Quod manifeste patet: nam aliquando aliqua copula est vera, affirmativa de in esse, in qua idem praedicatur de seipso, et tamen subjectum non est in rerum natura exsistens, immo nec aliquid. Quod probatur; quia ista est vera, negatio est negatio, privatio est privatio, non ens est non ens; quod patet: nam plus videretur ista neganda: caecitas est ens, quam ista: caecitas est" (*Def. Theol.*, Vol. I, p. 305a).

Capreolus then notes that Aristotle concedes the first as does Averroes, and this makes his point: "Patet ergo quod de illo quod non est aliquid in rerum natura, aliquid praedicatur, scilicet ens. Ergo multo plus idem praedicatur de seipso, sive sit exsistens, sive non." And then, by way of further comment on another text of Aristotle glossed by his Commentator (*Metaphysics* VII. 17. 1041a-10. [ed. McKeon, 810.]), "quaerere quare homo est homo, nihil est quaerére," Capreolus states: "Ex quibus patet quod, secundum eum, non est alia causa quare homo est homo nisi ista ratio communis: quia subjectum et praedicatum sunt indivisa, et subjectum est unum et idem praedicato." For a fuller appreciation of Capreolus's position on the predication of *ens* of what does not exist *in rerum natura* see *Def. Theol.*, Vol. I, p. 329b. Note also *ibid.*, p. 328b. Compare this last text with the text of Giles of Rome, *Quodl.*, V, 3 (Louvain, 1643), p. 273a, cited by Father Owens, *St. Thomas and the Future of Metaphysics*, p. 83, n. 39: "Dicimus enim quod natura creata, licet sit tantae actualitatis quod possit per se intelligi: non sit tamen tantae actualitatis, quod possit existere in rerum natura, nisi superaddatur ei actualitas aliqua, quae communi nomine vocatur esse." Note Capreolus's citation of a similar text of Giles of Rome (*Def. Theol.*, Vol. I, p. 315a).

have him say, that, granted the existence of Socrates, then the proposition "Socrates exsistit" is necessary in the first mode of *per se* predication. Rather, he had insisted that *per se* propositions of the first type—for example, "Man is an animal"—are necessary on the condition that a man, Socrates, should first exist. Concerned as Capreolus is with preserving essence and existence from any mutual interpenetration, he sees his opponent's position as maintaining either that the formal causality of essence extends even to existence, rendering one's existence as necessary as one's essence, or that *esse* and its radical contingency infect essence. In this way "Rosa exsistit" would be as necessary as "Rosa est rosa," or they would be equally contingent.

As a closing argument against the claim of conditional necessity, Capreolus insists that his opponent fails to distinguish between the twofold use of the copula *est* as a second and as a third adjacent. Used in the first manner, it signifies the actual existence of the subject. In its other usage it does not signify the actual existence of the subject but only the truth of the subject and predicate. In this latter way even what does not actually exist and is nothing at all can be said to exist and *ens* can be predicated of it. For on the authority of Aristotle and Averroes it can be said "Caecitas est ens," even though blindness is a privation and ". . . subjectum non est in rerum natura exsistens, immo nec aliquid." This makes it clear to Capreolus that something can be predicated of what does not exist *in rerum natura;* namely, *ens* It is thus all the more clear to him that the same thing is predicated of itself whether it is existing or not; for example, "Homo est homo." And the basic reason for this is that there is no other cause why "homo est homo" except the essence of man himself. Or if one would want to say it in another way, it is reducible to this, that subject and predicate are undivided, and one and the same.[28]

Still failing to appreciate his adversary's point, Capreolus continues his monologue. For the adversary had made his point in the existential order in the sense that, once man exists, the proposition "Man is an animal" is true. Again Capreolus answers him from the nonexistential order, the order *de tertio adjacente.* But this time we are not in the domain of the divine intellect but rather in the domain of logic and

the realm of *entia rationis*. By showing that something can be predicated of a nonexistent subject—even *ens*—Capreolus considers his refutation of the adversary's claim of conditional necessity to be complete. He is now prepared to answer his opponent's further interpretation of the texts of Grosseteste previously cited.

[29]"Secundo, dicetur quod cum dicit Linconiensis quod in propositionibus de per se, praedicatum est praecisa causa subjecti, vel econtra ipse loquitur de causa formali; non autem de causa efficiente. Licet enim homo seipso formaliter sit animal, non tamen seipso efficienter; immo ad hoc quod homo sit animal, requiritur causa efficiens, sicut ad hoc quod homo exsistit requiritur producens" (*ibid.*, p. 303a).

[30]"Secunda similiter responsio quae dabatur nulla est. Quod patet. Nam si Linconiensis intendat quod in talibus propositionibus per se primo, cujusmodi est ista; homo est animal rationale mortale, praedicatum sit praecisa causa formalis subjecti, non tamen sit praecisa causa quod insit subjecto, sed requiritur causa extrinseca ad hoc quod praedicatum subjecto conveniat, sequitur quod illa causa faciat aliquid postquam est, immo quod tale quid sit ejus effectus et non sit ejus effectus. Illa causa enim nihil faciente, adhuc praedicatum conveniret subjecto, quia sive subjectum sit, sive non sit, non minus est id quod est, ut, rosa est rosa. Ergo nulla causa facit quod quidditas rosae conveniat rosae . . . immo si aliqua causa faciat quod homo sit animal, illa faciet quod idea hominis includit rationem animalis; quod non potest fieri a Deo, nec a creatura. Et sic patet quod sic per se homo est animal quod per nullam causam extrinsecam efficientem homo est animal. Ad veritatem enim ejus sufficit quod praedicatum sit de ratione subjecti; hoc autem est . . . incommutabiliter verum et ineffectibiliter, nisi fingamus quod ideae sint effectibiles ab aliquo efficiente" (*ibid.*, p. 305ab). See further Capreolus in *ibid.*, p. 330ab, quoted *supra*, n. 27. For Capreolus, the essence in the divine intellect is numerically the same essence which is *in rerum natura*. Thus, for one to claim that the essence *in rerum natura* comes to be by an efficient cause, as is the case with Capreolus's anonymous adversary, is to claim further that the divine ideas—that is, the essences of creatures—are created. Cf. Capreolus: "Ad tertium (argumentum aliorum) . . . Verumtamen concedo quod illud idem, quod prius fuit in potentia, postea illud idem numero est in actu. Et sic est in proposito. Nam essentia creaturae, prius fuit in potentia ad esse; et illa eadem acquirit esse. Unde argumentum imaginatur quod quidquid est in creatura, transferatur de potentia in actum; quod est inintelligible, nisi actus transferatur de potentia in actum" (*ibid.*, p. 330b). For Capreolus's position on *ens in potentia* cf.: "Ad nonum (*Aureoli*) . . . Et ita potest generaliter distingui de ente in potentia: Scilicet de ente in potentia, in genere essentiarum; vel de esse in potentia, in genere exsistentiarum; sive, quod idem est, de potentia in genere entis quod dicit essentiam, vel in genere entis quod dicit exsistentiam. Tunc dico quod ens in potentia, in genere essentiarum, destruit ens totaliter; sed ens in potentia, in genere exsistentiarum, non destruit ens. Rosa enim, licet non exsistat, adhuc est rosa; et ens in potentia, in genere exsistentiae, adhuc est ens et essentia quaedam. Negatur ergo quod ens in potentia, isto modo quo dictum est, totaliter destruat ens. Et ideo actus oppositus illi potentiae aliquid addit ad illa quibus convenit. Ad confirmationem dico quod lapis, conceptus ut non positus in esse, concipitur ut nihil, in genere exsistentiae; non tamen ut nihil, in genere essentiae" (*ibid.*, p. 329b). For background on the problem of the divine ideas conceived as creatures see Gilson, *History of Christian Philosophy*, p. 773b, n. 78.

To Capreolus's citation of Grosseteste's claim that in *per se* propositions the predicate is the adequate and proper cause of the subject or vice versa, the rejoinder is made that in such texts he is speaking of formal cause and is not concerned with positively excluding an efficient cause by his use of *per se*. Man, for the adversary, is an animal by himself as a formal cause, but he is not an animal by himself as an efficient cause. For man to be an animal, an efficient cause is required just as much as it is required for man to exist.[29]

But, for Capreolus, to interpret Grosseteste after the fashion of the adversary—that is, that in the proposition "Homo est animal rationale mortale," the predicate is the formal cause of the subject; but an extrinsic efficient cause is needed to explain why such a predicate belongs to a subject or such a form is present in a subject—is to force a contradiction upon Grosseteste. Given such an interpretation, Capreolus maintains that it follows that the efficient cause produces something after it is, and that something is and is not its effect. For, as Capreolus has insisted all along, even with the efficient cause inactive, the predicate still belongs to the subject for "Rosa est rosa" with no rose actually existing. Thus, Capreolus can confidently conclude that no cause is required to make the quiddity of the rose belong to the rose. Indeed, given the divine idea of man, it immediately includes animal; and thus the truth of such eternal and necessary propositions as "Homo est animal" arises. Not even God, much less any of his creatures, can cause the idea of man to include animal. To say otherwise is to maintain that the divine ideas are produced by an efficient cause.[30]

Lest one be surprised at such a resolution to the problem of the distinction between essence and existence, wherein one who affirms that the essences of creatures come to be by an efficient cause is accused of maintaining that the divine ideas are created, it must be realized that this solution takes place because the problem has been posed in terms of an *esse essentiae* and an *esse existentiae* and the tradition behind them.

That this is so becomes clear by assessing the doctrinal traditions at work within Capreolus's lengthy defense of the first conclusion, "Nulla creatura subsistens est suum esse quo actu exsistit in rerum

natura." The first thing to be noted is the absence of any explicit texts of Capreolus's master, St. Thomas, asserting that the essences of creatures do not come to be by an efficient cause. Save for the initial text cited from the *Summa contra Gentiles*, II, cap. 52—a very brief and far from explicit text characterizing essence as *per se* and *esse* as *per aliud*—Capreolus gives his reader the impression that no other such texts are available. Indeed, St. Albert, Robert Grosseteste, St. Augustine, Avicenna, and Aristotle seem to bulk larger in Capreolus's mind at this point than does St. Thomas. Thus, on the

[31]*Def. Theol.*, Vol. III, p. 2ba, where the general question is raised "Utrum creatio sit aliquid?" The fourth conclusion (*ibid.*, p. 29b) is, "Quarta conclusio est quod nullum aliud a Deo potest esse, nisi creatum a Deo." For Aureolus's fourth argument against the fourth conclusion of Capreolus see *ibid.*, p. 44a.

[32]*Ibid.*, pp. 73a-75. St. Augustine is cited: "Sicut enim dicit Augustinus, 1ª Homilia super Joannem . . ." (see *PL*, XXXV, 1387). St. Thomas is then cited in agreement: "Cui concordat sanctus Thomas, *Contra Gentiles*, lib. 4, cap. 11, ubi dicit quod intellectum in intelligente, est intentio intellecta et verbum. Est igitur in Deo intelligente seipsum, Verbum Dei, quod est Deus intellectus; sicut verbum lapidis in intellectu, est lapis intellectus. Ibidem etiam dicit quod, licet haec sit falsa, Homo est verbum, tamen haec potest esse vera, Homo intellectus est verbum. Ex quo patet quod omnis essentia, antequam creetur, habet esse essentiae intelligibilis in Deo. Et ideo, antequam mundus fieret, erat in Deo lapis intellectus, et essentia rosae intellecta; et sic de caeteris. Essentia enim, vel quidditas, non est aliud quam illud quod importat ratio alicujus. Et quia ratio cujuslibet rei est aeterna in Deo; ideo quaelibet essentia aeternaliter est essentia vel quidditas. Esse enim essentiam, vel quidditatem, non est aliud quam habere rationem veram, non fictitiam, in intellectu alicujus vere intelligentis." St. Albert is cited (*ibid.*, p. 74b): "Item, Dominus Albertus, in Logica sua veteri, *Tractatu de Postpraedicamentis*, cap. 9 . . ." a text we have already confronted in the context of essence and existence. He is cited again: "Item, idem in Commento super Porphyrium, in *Tractatu* de communibus differentiis et convenientiis quinque universalium, cap. 8 . . ." (*ibid.*, p. 75b). For another citation, note "Item in Commento super *Praedicamenta*, exponens illud Philosophi, Destructis primis substantiis, impossibile est aliquid aliorum remanere (tract. 2, cap. 4) . . ." (*ibid.*). In addition, St. Thomas is cited from *Quodlibet* 8, 1, 1, a text Capreolus has quoted in the context of essence and existence.

[33]"Apparet igitur, prima facie, quod, licet nulla essentia creata fuerit ens ab aeterno, loquendo de ente prout dicit actum essendi vel actualem existentiam, tamen quaelibet essentia semper fuit id quod nunc est essentialiter et per se: puta quod homo semper est homo, semper est animal, semper est corpus, semper est substantia, semper est essentia, vel ens quod dicit essentiam. Et hoc secundum mentem Alberti, et multorum aliorum; cujus etiam opinionis videtur esse sanctus Doctor" (*ibid.*, p. 76a).

This doctrine of *ens prout dicit actum essendi vel actualem exsistentiam* and *ens quod dicit essentiam* is a commonplace in Capreolus in the context of this discussion of creation and especially in the context of essence and existence. And in each case it is clearly derived from a doctrinal complex found in St. Albert and the Arabic tradition of Avicenna, Algazel, and Alfarabi propounding the doctrine of an uncreated essence. Note *ibid.*, p. 71a.

score of the uncreated essence, Capreolus finds himself unable to fulfill his initial program and cite his master's own words on behalf of this point in proof of his first conclusion. So it is that, from this complex doctrinal tradition, the doctrine of an *esse essentiae*, in which essence as essence has being proper to itself, comes to assert itself within the Thomistic tradition and guide the exegesis of the texts of the master himself.

Capreolus himself leaves no doubt on this point when, in answering an argument of Aureolus against his fourth conclusion on the question of creation,[31] he cites the same doctrinal complex of St. Augustine and St. Albert, and the Arabian tradition of Avicenna, Algazel, and Alfarabi alluded to by St. Albert, which we have just confronted here.[32] Furthermore, Capreolus notes his own appraisal of this tradition:

> It is therefore clear, at first sight, that, though no created essence was a being from eternity, when we use the term "being" in the sense of "act of being" or "actual existence," nevertheless any essence always was that which it is now essentially and of itself—for example, that man always is man, always is animal, always is body, always is substance, always is essence, or being in the sense of essence. This is said according to the mind of Albert and many others. The holy Doctor also seems to be of this opinion.[33]

The certainty with which Capreolus ascribes this doctrine to St. Albert and many others contrasts rather starkly with his hesitancy in attributing this position to St. Thomas. A similar hesitancy is called for even in our day, and all the more so in light of the way in which Capreolus resolves his hesitancy and uncertainty:

> If, however, this position is not satisfactory, let a person hold what St. Thomas holds, *On the Power of God*, question 3, article 5, where he argues this way: "All things which are made by God are said to be the creatures of God. But creation terminates at *esse*, for 'the first of all created things is *esse*,' as it is said in the book *On the Causes*. Since, therefore, the quiddity of the thing is other than its *esse*, it seems that the quiddity of the thing is not from God." This is the argument. There follows his answer (ad 2^{um}). "From this very fact," he

says, "that *esse* is given to the quiddity, not only the *esse* but the quiddity itself is said to be created, because, before it has *esse*, it is nothing, except perhaps in the intellect of the Creator, where it is not a creature, but the creative essence." These are the words of St. Thomas. And I think that this second way is more

[34]"Si tamen illa positio non placet, teneatur quod tenet sanctus Thomas, *de Potentia Dei*, q. 3, art. 5, ubi sic arquit: 'Omnia quae a Deo sunt facta, dicuntur esse Dei creaturae. Creatio autem terminatur ad esse; prima enim rerum creatarum est esse, ut habetur in libro *de Causis*. Cum igitur quidditas rei sit praeter esse ipsius, videtur quod quidditas rei non sit a Deo.' Ecce argumentum. Sequitur responsio (ad 2[um]): 'Ex hoc ipso, inquit, quod quidditati esse tribuitur, non solum esse, sed ipsa quidditas creari dicitur; quia, antequam esse habeat, nihil est, nisi forte in intellectu creantis, ubi non est creatura, sed creatrix essentia.'—Haec sanctus Thomas. —Et puto quod ista secunda via est securior. Nec tamen alia via est erronea, nec errori proxima nisi pro quanto videtur ponere quod essentia habeat aliquod esse, et non a Deo. Sed hoc non debet movere. Quia, sicut dicit Henricus, et bene, meo judicio, essentia habet duplex esse, scilicet esse essentiae, et esse exsistentiae; et quodlibet istorum habet a Deo; sed primum habet a Deo ut est causa exemplaris, dans per suum intelligere esse intelligibile et quidditativum cuilibet essentiae; secundum autem esse dat, ut est causa efficiens; et sic non sequitur quod creatura habeat aliquod esse quod non sit a Deo, sed solum quod non dicitur creari quantum ad primum, sed quantum ad secundum esse. Item, quia, ut supra tactum est, esse possibile, esse intelligibile, esse quidditativum, cum non sit esse nisi secundum quid, non est per creationem; sed sufficit quod sit per intellectionem divinam, in genere causae formalis."

See also *ibid.*, p. 72b, *ad tertium principale*. Note also in the context of essence and existence: "Verumtamen dico quod, sumendo ens nominaliter, prout dicit essentiam decem praedicamentorum . . . Quia ens sumptum participaliter, quod convertitur cum hoc quod dico exsistens . . ." (*ibid.*, Vol. I, p. 384b, 326a, 327a, 327b, 328a, 328b, 329ab.) Corresponding to the two kinds of being are the two kinds of *nihil*: "Non plus enim ridiculum est distinguere de nihilo, quam de non ente. Sed constat quod Philosophus, 5 *Physicorum*, particula 8; et 4 *Metaphysicae*, particula 2, distinguit de multiplici non ente. Quare non est inconveniens distinguere de nihilo, prout negat exsistentiam" (*ibid.*).

[35]*Ibid.* See Henry of Ghent, *Quodlibeta* (Paris: Jacobus Badius Ascensius, 1518) I, q. 9, fol. 6v-7r. Capreolus has cited Henry of Ghent elsewhere in the same place: ". . . dicitur quod dicentes lapidem, qui prius erat purum nihil, etc., intelligunt quod lapis erat omnino nihil in genere exsistentium; nec erat ibi aliquid ultra tale nihil, exsistens in actu, et de quo posset dici, hoc est actu. Erat ultra nihileitatem, quae est carentia actualis exsistentiae, essentia in esse essentiae; quae, absolute considerata, ut natura vel quidditas, est substrahibilis nihileitati exsistentiae et aliquidditati exsistentiae, hoc est, ipsi esse vel non esse actualis exsistentiae. Et ipsa, secundum se, semper est aliquid in genere essentiarum, et in esse intelligibili, et in potentia activa Creatoris, licet non in esse reali actuali, ut declarant Henricus, et Godofridus, et Bernardus de Gannato" (*Def. Theol.*, Vol. III, p. 73a). On the basis of Capreolus's liaison with Henry of Ghent, one may well ask, how, in holding the real distinction as he does, he can avoid concluding to the intentional distinction of Henry. The Godfrey noted seems to be Godfrey of Fontaine and the text which Capreolus may have in mind might be the one quoted by M. Grabmann, "Doctrina S. Thomae de Distinctione Reali inter Essentiam et Esse ex Documentis Ineditis Saeculi XIII Illustratur," *Acta Hebdomadae Thomis-*

secure. However, the first way is not erroneous or even close to error, except insofar as it seems to hold that the essence has some *esse* and not from God. But this difficulty should not move us. For, as Henry says—and says well, in my judgment—the essence has a two-fold *esse*—namely, the *esse* of essence and the *esse* of existence—and it has both of these from God. The first it has from God inasmuch as He is the exemplar cause, giving by His act of understanding the intelligible and quidditative *esse* to any essence. The second *esse* He gives inasmuch as He is the efficient cause. Thus, it does not follow that the creature has some *esse* which is not from God but only that it is not said to be created as regards the first but only as regards the second *esse*. Again, because, as was mentioned above, possible *esse*, intelligible *esse*, quidditative *esse*, since it is only an *esse secundum quid*, is not by creation; but it is sufficient that it be by the divine intellection, in the genus of formal cause.[34]

The tradition of St. Albert, Avicenna, and others is thus crowned by the name and doctrine of Henry of Ghent—which is as it should be, both historically and philosophically, because his doctrinal position on being is cut from the same cloth. And even though Capreolus retires to the dubious security ("Et puto quod ista secunda via est securior") of St. Thomas's own words, the doctrinal inspiration presiding over the interpretation of his master's words remains the alien metaphysical position of Avicenna, St. Albert, and Henry of Ghent. And though this latter tradition may have become the "Thomistic tradition" on the question (and I am certain that it has[35]), it is a Thomistic tradition which does not derive from St. Thomas Aquinas.[36]

tiae (Roma, 1924), p. 150. Bernardus de Gannato is also known as Bernard of Clermont or Bernard of Auvergne. See P. Wyser, O.P., *Der Thomismus*, Vols. 15-16 et *Bibliographische Einführungen in das Studium der Philosophie*, ed. I. M. Bochenski, (Berne: Franke, 1948-51) Vol. XIV, No. 32.20. The text of Bernard edited by E. Hocedez in *Quaestio de Unico Esse in Christo a Doctoribus Saeculi XIII Disputata, Textus et Documenta, Series Theologica* (Rome: 1933), pp. 101-14, contains a discussion of the question in terms of *esse essentiae* and *esse existentiae*.

[36]The doctrine of an uncreated essence among the *Thomistae* after Capreolus may be found in Paulus Barbus Soncinas, *Quaestiones Metaphysicales* (Venetiis, 1498), Bk. 4, q. 12, fol. B^5ra-B^5va. *Tertio principaliter arguitur . . .*; Cajetan, *Commentaria in De Ente et Essentia D. Thomae Aquinatis*, ed. Laurent, cap. V, p. 157;

Throughout this intricate argumentation we have seen Capreolus philosophize (or, perhaps better, theologize) almost by proxy. For he makes it clear to his reader that he has reached his conclusions on the distinction between essence and existence in and through certain authoritative texts of other theologians and philosophers. St. Thomas Aquinas, avowedly, is Capreolus's chief proxy; but in the text we have examined he has been textually superseded by St. Albert, Robert Grosseteste, St. Augustine, Avicenna, and now Henry of Ghent. St. Thomas, however, is not superseded doctrinally, for all of these citations are offered as positions on essence and existence which to Capreolus "videntur de mente S. Thomae fuisse." And the over-all burden of such texts holds for an uncreated essence on the part of the creature as contrasted with a created existence. Whereas the existence of creatures is due to God as efficient cause, their essence does not come to be by an efficient cause. For Capreolus, consequently, essence is distinguished from existence as that which *is not* produced by a creative efficient cause is distinguished from that which *is* produced by a creative efficient cause. It is a distinction between the necessary and the contingent, neither of which can be identified with the other. It seems to be clear that this is what Capreolus thinks is "de mente S. Thomae." I think, though, it is a position that is not true to the doctrine of St. Thomas himself.

Sylvester of Ferrara, In *Summa contra Gentiles*, ed. Leonine, (Rome, 1930), Tome XIII, 389a, V; Chrysostomus Javellus, *Tractatus de Transcendentibus*, Cap. IV, 466b-467a, in his *Totius Philosophiae Compendium*, (Lugduni, 1568), Vol. I. It is precisely this widespread doctrine of the *Thomistae* which makes it mortally vulnerable to the Suarezian critique: "In the present revival of interest in the metaphysical doctrine of St. Thomas, the case of Suarez is perhaps the best object lesson in what happens when the Thomistic essence is represented as any kind of essential *being*, or even conceived as having some kind of proper being in its own right, whether such being is looked upon as real or as only intentional." See Joseph Owens, C.SS.R., "The Number of Terms in the Suarezian Discussion on Essence and Being", THE MODERN SCHOOLMAN, XXXIV (1937), 191.

Thus should anyone allude to "the Thomistic tradition" on the possibles he may be historically accurate. But this in no way indicates that St. Thomas is a party to such a position. See Owens, "The Number of Terms," p. 190, n. 101: "There is of course nothing to prevent the word 'Thomist' from being used in a number of different senses as far as doctrine is concerned. For Suarez, according to the usage of his times, it meant the school of thought represented by Capreolus, Cajetan and so on. 'Thomistic' is still used today in that sense . . ."

PLATONISM IN POSITIVISM

TADEUSZ GIERYMSKI *is an assistant professor of psychology at the College of St. Thomas, St. Paul, Minnesota. He studied at the Royal Irish Academy, Dublin, and Cambridge University. He is presently engaged in doctorate work in clinical psychology at the University of Minnesota. He has written for many philosophical journals, including* Philosophical Studies (*Maynooth*), New Scholasticism, *and* THE MODERN SCHOOLMAN.

An ancient Greek epigram says pithily, "Wherever I wander in my mind, I meet Plato coming back." In our own times Whitehead is reported to have described all philosophy as a series of footnotes to Plato. If this is an exaggerated opinion for philosophy in general, the epistemology of logic and mathematics in logical positivism may perhaps be taken as lending some support to it.

In a recent article on logical positivism [1] Mr. Slattery singles out the status of propositions in mathematics and logic as being the testing ground for the truth of the logical positivist theory of knowledge—at least in its most widely known formulation by Professor Ayer.[2] This was a fair choice on Mr. Slattery's part, since Professor Ayer himself admits that these types of propositions present a difficulty to a positivist and that a failure to solve that difficulty would force him to give up his whole empiricist position.[3] Furthermore, although Professor Ayer has found it advisable in his later works to modify some of the views put forward in *Language, Truth and Logic*, he has never changed his position on the status of propositions of logic and mathematics.[4] Thus for Professor Ayer the propositions of logic and mathematics are still necessary, lacking in factual content, and somehow applicable to the physical world.

Mr. Slattery concerned himself with the difficulties in Professor Ayer's theory of arriving from the empirical at the necessary. He asked the pointed question, Why was it allowable to derive the neces-

sary propositions of mathematics and logic from the empirical contingent world, in view of the strict injunction against doing so for the necessary propositions of metaphysics?[5] The following inquiry deals with the problems and implications of the firmly held tenets in Professor Ayer's philosophy: namely, the nondescriptive character of logico-mathematical statements; their seemingly arbitrary character; and their applicability to, and usefulness in the description of, the physical world.

We must remind ourselves that Professor Ayer, as a self-avowed empiricist, cannot admit any other heuristic avenue but that of experience. It is perhaps not surprising to hear him aver that logic and mathematics are learned the same way as chemistry and history have to be learned.[6] Yet, he says of these propositions that "none of them provide any information about any matter of fact. In other words, they are entirely devoid of any factual content . . ."[7] The most important question that should now be asked is: How is it possible to arrive at such nondescriptive propositions, which give us no information about any matter of fact, about any empirical situation, while starting out from the empirical world of sense experience?

This can only happen by a mistake in the description of the procedure or because Professor Ayer has taken leave of his own empirical sources of knowledge. Leaving aside the former alternative, we see that the latter seems to shatter the whole basis of the logical positivist epistemology. If we learn arithmetic through the medium of sense

[1]M. P. Slattery, "Thomism and Positivism," *Thomist*, XX (Oct., 1957), 447-69.

[2]A. J. Ayer, *Language, Truth and Logic* (2d ed.; Gollancz, 1951).

[3]*Ibid.* pp. 72-73. Professor Ayer asserts as much again in *Revolution in Philosophy* (Macmillan, 1956), pp. 70-77.

[4]Professor Ayer says: "If empirical statements had the formal validity which makes the truths of logic unassailable they could not do the work that we expect of them; they would not be descriptive of anything that happens. In demanding for empirical statements the safeguard of logical necessity, these philosophers have failed to see that they would thereby rob them of their factual content" (*The Problem of Knowledge* [Pelican, 1956], p. 41).

[5]"Thomism and Positivism," pp. 457-59.

[6]*Language, Truth and Logic*, p. 74.

[7]*Ibid.*, p. 79.

[8]*Contemporary Philosophy* (London; Burns & Oates, 1956), p. 34.

[9]*Language, Truth and Logic*, p. 73.

[10]Professor Ayer says about a-priori propositions: "And the reason why we are entitled to feel no doubt about their truth may be that we can prove them; or even that we can see them to be valid; in either case there is an appeal to intuition since we have at some point to be able to claim to see the validity of a proof" (*Problem of Knowledge*, p. 43).

[11]*Language, Truth and Logic*, p. 74.

[12]*Ibid.*, p. 75.

experience, then arithmetic must have some factual content, however general. Otherwise, why should *any* knowledge derived from sense experience be factual? If, on the other hand, arithmetic has no factual content, then it is not derived from experience; it is not learned in the same way that chemistry and history are learned. Where then does it come from? Innate ideas? A Platonic heaven? What would be the process of acquiring such knowledge? And if such a process is admitted, is one who admits it still an empiricist?

According to Copleston,

> the fact that the logical positivists accept the view that the propositions of formal logic and pure mathematics are analytic and certain means that one has to make a reservation if one wishes to speak of logical positivism as "sheer empiricism". . . . However, if one leaves on one side their view of formal logic and pure mathematics, one can say that logical positivists maintain a "radical empiricism".[8]

The "if" of Father Copleston's last sentence gives the whole game away. It clearly shows the pitfall of double epistemology that Professor Ayer falls into. Somewhere on the road to learning arithmetic, mathematics, and logic, we take leave of sense experience and have recourse to a not very well explained "intuition." Professor Ayer's attempts to avoid rationalism[9] drive him into some mysterious form of intuitionism.[10] He admits as much when, with reference to propositions of logic and mathematics, he stresses the distinction between saying that all knowledge begins with experience and saying that all knowledge comes out of experience,[11] and when he says that he is "obliged to be somewhat dogmatic" about this matter of learning necessary propositions, that he "can do no more than state the issue clearly" and trust that we can "see" the falsity of Mill's position and the truth of his own. He expects us to "see" or to "apprehend" the necessity of mathematical propositions from experience;[12] yet he gives us no satisfactory or convincing account of the nature of that process. And yet this is *the crucial point in the whole of empiricist thought.* The charge that Professor Ayer has abandoned empiricism seems amply justified; if he has not, if it is true, as he

says, that a discovery of a logical or mathematical truth is due to an inductive procedure,[13] we fail to see how such propositions can lack *some* factual content. We see that Professor Ayer makes these assertions: (*a*) knowledge of logic and mathematics is independent of experience—a statement which he eventually claims means that they do not owe their validity to it—(*b*) discovery of logico-mathematical truths is a result of inductive procedure. We submit that *a* amounts to departure from empiricism, *b* is irreconcilable with factual emptiness, and that *a* and *b* are contradictory. But whether consistently or not, Professor Ayer constantly maintains that such propositions do not describe physical reality.

At this point one is irresistibly reminded of the Platonic doctrine of the line. On the one hand we have a set of empirical propositions contingently describing the physical world—the probable statements and hypotheses of logical positivism, closely allied to Platonic *doxa*. On the other hand we have a set of necessary immutable truths which are not about the contingent physical world and which are known, furthermore, by some special process of "seeing" or "apprehension" rather reminiscent of Platonic *dianoia* or *episteme*.

This Platonic dualism in Professor Ayer's doctrine raises the fundamental question of how mathematics and logic can apply to the physical word. For he says of these propositions that "none of them provide any information about any matter of fact. In other words they are entirely devoid of factual content . . . consequently they say nothing . . ." [14] Elucidating further his view of these propositions he says:

> Thus if I say, "Nothing can be coloured in different ways at the same time with respect to the same part of itself", I am not saying anything about the properties of any actual thing; but

[13] *Ibid.*, p. 74.
[14] *Ibid.*, p. 79
[15] *Ibid.* (Italics mine.)
[16] We read for example that "many branches in pure and applied sciences are frustrated in their development because present day mathematical thinking does not give accurate solutions to some key problems. Proper application of mathematical methods guarantees a complete formulation of a complex physical phenomenon and a consistent analysis of its implications" (J. Turkevitch, "Soviet Science in the Post-Stalin Era," *American Academy of Political and Social Science Annals*, CCCIII [Jan., 1956], 141).
[17] One cannot help recollecting Wittgenstein's way of talking about language games when discussing philosophical problems.
[18] *Language, Truth and Logic*, p. 13.

> I am not talking nonsense. I am expressing an analytic proposition *which records our determination* to call a colour expanse which differs in quality from a neighbouring colour expanse a different part of a given thing. In other words I am simply calling attention to the implications of certain linguistic usage.[15]

Is he trying to tell us that if he had determined otherwise he could have had something which was colored in different ways with respect to the same part of itself? Are not these statements difficult to reconcile with the well-known fact that the developments in the physical sciences are so much dependent upon developments in the field of mathematics? If mathematical propositions *really* say nothing, why are they so crucially important?[16]

We should pay close attention to the preceding quotation, for it introduces a new element into our discussion; namely, the characteristic of arbitrariness attaching to the analytic propositions. If they record our *determinations*, what distinguishes them from, say, the rules of chess or some other game?[17] The fact that the propositions and rules of logic are necessary while those of chess are not? Whence, then, the necessity of logico-mathematical statements? Professor Ayer provides an answer: "If they are necessary, it is only because the relevant linguistic rules are presupposed."[18] But to base the necessity of logic and mathematics upon relevant linguistic rules which turn out to be arbitrary is unintelligible. The difference in the nature of our determinations concerning rules of chess and analytic statements such as Professor Ayer describes is nowhere satisfactorily explained. What is more, if this voluntarism were taken literally, we should question the need, however inconsistent it was shown to be already, for his saying that the discovery of logical and mathematical truths is a result of an inductive procedure. There would be *no* discoveries. Logical truths would be our *fiats*.

It is instructive to look at what the logicians and mathematicians themselves say about what they do and how they do it when they construct a system. Quite a different impression concerning the supposed lack of descriptiveness and arbitrariness of logic and mathematics can be obtained from their writings. This impression becomes

strengthened if we also take a look at the historical setting in which mathematics developed, if we realize that a lot of it developed in response to the pressing needs of practical affairs and physical sciences.[19] Even if this observation is not a proof against Professor Ayer's position, it may perhaps raise some doubts about it. And if we pay attention to the formal properties of mathematico-logical systems, again we shall be impressed by the apparently stronger link existing between the system and the physical world than Professor Ayer's position seems to allow.

Let us elaborate on some of the above points a little. Professor Ayer's statements remind us of the famous *dictum* of Russell that mathematics is a subject in which we never know what we are talking about or whether what we are saying is true.[20] To express the same idea with less pungency but in a more technical language, Russell is pushing the syntactical approach to mathematics to extremes, abstracting from, and neglecting as unimportant, the other dimensions of semiotic, especially that at which interpretation appears. Commenting upon Russell's remark Tarski suggests we should take it critically. If we behave as if we did not understand the meaning of the terms of the discipline, this is not the same thing as denying that they have meaning. In fact a formal system for which there would be no single interpretation would be of interest to nobody.[21] An objection could be raised that Professor Ayer never denied meaningfulness to logic and mathematics. He did not. What we are trying to do is to show that the idea of interpretation which lies at the root of our construction seriously weakens Professor Ayer's assertions of nondescriptiveness and arbitrariness.

[19]T. Dantzig, *Number, the Language of Science* (Anchor, Doubleday); L. O. Kattsoff, *A Philosophy of Mathematics* (Iowa State College Press, 1948); M. Kline, *Mathematics in Western Culture* (New York: Oxford Univ. Press, 1952); R. L. Wilder, *Introduction to the Foundations of Mathematics* (J. Wiley & Sons, 1952), chap. 12.

[20]*Mysticism and Logic* (New York: W. W. Norton & Co., 1929), p. 75.

[21]A. Tarski, *Introduction to Logic and Methodology of Deductive Sciences* (2d ed.; Oxford, 1946), p. 129.

[22]*Foundations of Mathematics*, p. 20.

[23]B. Sobocinski, "In Memoriam Jan Lukasiewicz," *Philosophical Studies* (Maynooth), Dec., 1956, p. 31.

[24]E. R. Stabler, *An Introduction to Mathematical Thought* (Addison-Wesley, 1953), p. 141.

[25]N. A. Court, *Mathematics in Fun and in Earnest* (New York: Dial Press, 1958), pp. 31-32.

[26]Quoted in Court, *ibid.*, p. 33. One could also mention that Lesniewski, a first class logician, maintained at one time that logic, like the other sciences, deals with physical objects, only that it describes them more generally.

Wilder puts it even more strongly and more explicitly than Tarski did. Discussing axiomatic method in modern mathematics, he describes an axiom as a statement which seems to hold true for an underlying concept, and an axiom system as a collection of such statements about the concepts. Although he considers the theoretical possibility of constructing axioms out of undefined terms to which no meaning was attached—that is, without an introduction of some concept to be talked about—he claims that even if one did find something to say, which is unlikely, one was very likely to contradict oneself soon. As he says: "The underlying concept is not only the source of the axioms, but it also guides us to consistency . . ." [22]

Sobocinski, a logician, avers that reality is such that a certain system of logic imposes itself upon us.[23]

The history of the attempts to devise a criterion for one of the most important properties of logico-mathematical systems also undermines our confidence in the correctness of Professor Ayer's views. We are referring to the problem of consistency; that is, of devising a way of providing that a formula of the form "P.-P" is not deducible in our system. There is no absolute logical proof of consistency, and the only general method available is through a model or interpretation. As often as not, the model used is a physical one.[24] This situation led Court to say:

> This method of procedure is very significant. It expressed the fundamental belief that logical consistency is identical with natural consistency. It makes the consistency of nature to be one of the foundations, one of the cornerstones of the mathematical edifice.[25]

Hilbert himself, the formalist *par excellence*, apparently went even further, saying: "Indeed geometry is just that part of physics which *describes* the relations of positions of solids to one another in the world of real things." [26] Coming from Hilbert it is a most significant statement and quite at odds with Professor Ayer's views.

It should be stressed that the preceding paragraphs amount to much more than arguments from authority. We quoted some first-class practitioners of logic and mathematics; the problems discussed are

those lying at the very core of both disciplines. It is hard to imagine that the discussion of how such problems arise and how they are met would be irrelevant to our understanding of the status of logico-mathematical statements. Unfortunately Professor Ayer chose not to concern himself with such problems to any great extent. This prevented him from seeing the relation of logic and mathematics to reality in such a way that the possibility and fact of the applicability of both becomes intelligible and inevitable; on his premises it is neither really. A Thomist would maintain that both logic and mathematics reflect the world, arise out of our experience of it, and that because of that fact the applicability of both to the world is not surprising. Such also seems to be the views of the writers we quoted. However strange it may appear, it looks as if the mathematicians and logicians we referred to were more empirically minded than Professor Ayer himself.

Since we have already drawn attention to the Platonic overtones of the positivist epistemology, it might be instructive to consider how far the real Platonist is faced with the same problem. The fact is that

[27]Cf. "Why Are the Calculuses of Logic and Mathematics Applicable to Reality?" Proceedings of the Aristotelian Society, Symposium S., Vol. XX, 1946. See also A. Pap, *Elements of Analytic Philosophy* (Macmillan, 1949), chap. 6.

[28]Gilson says: "If there were such a science as a phenomenology of metaphysics, Platonism would no doubt appear as the normal philosophy of mathematicians and of physico-mathematicians. Living as they do in the world of abstract, intelligible relations, they naturally consider number as an adequate expression of reality. In this sense, modern science is a continually self-revising version of the *Timaeus*, and this is why, when they philosophize, modern scientists usually fall into some sort of loose Platonism. Plato's world precisely is the very world they live in, at least *qua* scientists" (*Being and Some Philosophers* [2d ed.; Toronto, 1952], p. 41).

And W. V. O. Quine makes a similarly revealing remark: "Let us see how, or to what degree, natural science may be rendered independent of platonistic mathematics: but let us also pursue mathematics and delve into its platonistic foundations" (*From a Logical Point of View* [Harvard, 1953], p. 19).

[29]A. Koestler, *The Sleepwalkers* (Hutchison, 1959), p. 40. Cf. also A. H. Armstrong: " 'Things are numbers' is a fundamental Pythagorean doctrine, interpreted in many different ways at different times by different members of the school, but always meaning that the essential reality of things can be in some way completely expressed in numerical terms; from this primitive doctrine a long and complicated line of development leads to modern mathematical physics" (*An Introduction to Ancient Philosophy* [Methuen, 1957], pp. 7-8).

[30]A. N. Whitehead, *Science and the Modern World* (Cambridge Univ. Press, 1943), pp. 47-48. See also n. 26.

[31]Cf. A. Koestler: "One may note in passing that some of our logical positivists transferred into the seventeenth century would have dismissed the question what a planet 'weighs' with

he is not faced with it; or, at least, the conflict is reduced to far lesser proportions. This is because of the Platonic metaphysical system. In the Platonic doctrine of participation, the physical world is an imperfect copy of the real intelligible world of *mathematical Ideas*. So a bridge is formed between the contingent physical world and the necessary world of mathematical reality. The application, then, of mathematical formulae to the physical world is the direct result of Platonic metaphysics. The physical world has reality and therefore intelligibility only insofar as it somehow embodies or copies mathematical laws. So the dependence of our knowledge of the physical world on our knowledge of mathematics is no mystery at all for the Platonist. It is the most evident thing possible to him.

Not so, however, with Professor Ayer. He has made a hard and fast division between the necessary world of mathematics and the contingent world of sense experience; and he can give no reason why we should even suspect for a moment that the physical world is amenable in any way at all to mathematical modes of investigation. His supreme reality, the world of sense data, if it gives rise to a knowledge of logic and mathematics, does so in a manner so highly mysterious that it should be totally unacceptable to any true empiricist. It is only fair to say that the positivists themselves are not unaware of such difficulties and that they have made numerous attempts to explain how propositions of logic and mathematics apply to the physical world. Although it is not the task of this paper to examine the proposed solutions,[27] one cannot help feeling that as long as we follow the lines indicated by Professor Ayer, they are not likely to be satisfactory.

As opposed to the empiricist, the Platonist can consider the whole rise and development of mathematical physics as an illustration and a confirmation of his metaphysics; as, in fact, the *Timaeus* brought up to date.[28] This Pythagorean conviction that numbers are the key to the understanding of the world seems to be specific to the Western civilization.[29] If it had not permeated the thinking of the Western scientist,[30] if the West had enjoyed solely a logical-positivist type of philosophy, one feels that anyone suggesting it would have been shouted down with cries of "nonsense."[31] Propositions which say nothing are after

all not generally thought of as offering the key to the discovery of truth, least of all truth about the physical world. Thus we see that if we are to seek the philosophical background for the development of mathematical physics, we have to go into a very different philosophical tradition from that represented by Professor Ayer and his school.

The fact is that Professor Ayer's position with respect to logic and mathematics is radically unstable. It suffers from internal difficulties. It seems to be based upon inadequate consideration of the history of the subject and of the most important problems therein. It suffers from the disadvantages of Platonic dualism, without offering any of its attractions, substituting for them half-hearted empiricism. Mr. Slattery seems to be quite justified when he says that the only logical course Professor Ayer can adhere to if he wishes to keep to his special brand of empiricism is to adopt the position of J. S. Mill.[32] Mill took the heroic course of saying that mathematics consisted of *contingent* propositions with high probability value; being in principle falsifiable, they were also descriptive. But if Professor Ayer prefers not to follow Mill and to keep to his own strict dualism of the analytic and empirical, then he must give up his crude empiricism and adopt either Platonism or Kantianism,[33] both of which entail giving up his "nonsense" theory of metaphysical statements. Actually, since he rejects the synthetic a-priori proposition, he is left only with

an airy wave of the hand; and if their attitude had prevailed, the scientific revolution would not have taken place" (*The Sleepwalkers*, p. 499). E. A. Burt says: "In the light of these considerations it is safe to say that even had there been no religious scruples whatever against Copernican astronomy, sensible men all over Europe, especially the most empirically minded, would have pronounced it a wild appeal to accept the premature fruits of an uncontrolled imagination, in preference to the solid inductions, built up gradually through the ages, of man's confirmed sense experience. In the strong stress on empiricism, so characteristic of present day philosophy, it is well to remind ourselves of this fact. Contemporary empiricists, had they lived in the sixteenth century, would have been the first to scoff out of court the new philosophy of the universe" (*The Metaphysical Foundations of Modern Physical Science* [New York: Humanities Press, 1951], p. 25).

[32]"Thomism and Positivism," pp. 457-59.

[33]Discussing the propositions of logic and mathematics Professor Ayer says: "Their truths are certain because we do not admit the possibility of their being falsified . . . there is a strong echo of Kant in this position . . . and indeed the analogies between Kant and Wittgenstein are surprisingly close" (*Revolution in Philosophy*, pp. 76-77). And it is not necessary to elaborate upon the relation of Wittgenstein to logical positivism and to Professor Ayer, at least insofar as the propositions of logic and mathematics are concerned.

[34]"Thomism and Positivism," pp. 459-61.

Platonism—which is after all a philosophy that no one need feel ashamed of.

But of course, Platonic dualism has its difficulties; and Professor Ayer might still wish to retain his empiricist leanings. In that case, as Mr. Slattery pointed out,[34] he has only to inspect the Aristotelian theory of induction; that is, of knowledge through "abstraction," as it is called, from sense experience. On this basis, Professor Ayer can have his necessary propositions deriving from the world of sense experience. Of course, there is a price to pay—he will still have to reinstate metaphysics. For in the Aristotelian theory of induction, necessary propositions so derived are certainly descriptive and include propositions of a metaphysical character as well as those of logic and mathematics.

The Philosophy Department of Fordham University has announced the publication of a new philosophical journal, *International Philosophical Quarterly*. The first issue will appear in January, 1961. Its co-editorship by the Jesuit philosophy faculty of Berchmans Philosophicum, Heverlée-Louvain, Belgium, and the collaboration of philosophers in America, Europe and Asia, will assure a truly international outlook and roster of contributors. The objective of the review is to provide an international forum in English for a contemporary expression of the great tradition of theistic, spiritualist and personalist philosophy. There will be no further restriction of schools within these broad lines. The review hopes to reach a wide audience in the Orient, which at present is imperfectly acquainted with the spiritual tradition of Western philosophy. A second special objective will be to encourage greater mutual understanding between Anglo-American and continental European philosophers, who since the war have tended to work in growing isolation from each other, to their mutual detriment. Hence three articles in each issue will be reserved to European contributors. Subscriptions will be $6.50 a year for four issues (640 pages). All mail should be addressed to: *International Philosophical Quarterly*, Fordham University, New York 58, New York.

The Metaphysical Society of America, which was founded in 1950 at New Haven by Paul Weiss, Professor of Philosophy at Yale, is now an international society. It has become a member of the Fédération Internationale des Sociétés de Philosophie and of the American Council of Learned Societies. Transcending special issues and the limited tendencies of many philosophers, this association persues with vigor and thoroughness the questions which underlie all others and which have perplexed mankind from the beginning of its career of reflective thinking and intelligent action. Its 1961 meeting will be held at Clark University, Worcester, Massachusetts, on March 18. Its president for 1960-61 is Henry Veatch, of Indiana University.

The Thirty-fourth Session of the Indian Philosophical Congress was held at Cuttack, Orissa, under the auspices of the Utkal University, December 28-31, 1959. The Indian Philosophical Congress was founded by Dr. S. Radhakrishnan. Its first meeting was held in 1925, in Calcutta, and Dr. Rabindranath Tagore was its first president. The Indian Philosophical

(Continued on p. 60.)

Edward MacKinnon, S.J.

ATOMIC PHYSICS AND REALITY

Mr. Edward Mackinnon, s.j., *received his Ph.D. in physics from Saint Louis University, and his M.A. in philosophy from Weston College (Massachusetts). He has previously written for the* American Scientist *and* The Modern Schoolman, *and is now studying theology at Weston College.*

The development of physics in the twentieth century centers around two great achievements, the theory of relativity and quantum theory. It is generally agreed that the latter is the most revolutionary and far-reaching theory in the history of physics since the days of Newton. Here, however, general agreement ends, for the proper interpretation to be given to quantum theory and its relation to reality has been a subject of continuing debate for over thirty years. The most widely accepted view, the so-called "orthodox interpretation" championed by Bohr and Heisenberg[1] represents a peculiar mixture of physics and philosophy. Their contention is: No one can consistently accept the facts of atomic physics and reject their interpretation of them; no one can logically accept their interpretation and reject its philosophical implications. Nevertheless, the philosophical implications have been found unacceptable by many philosophers of different schools.[2]

Before accepting or rejecting any part of this physics-philosophy one must know which aspects of it are clearly established, which are doubtful, and which are gratuitous assumptions. This we intend to indicate in the present paper by outlining the historical development of the theory and the reasons which have been adduced for and against it. The theory itself, the so-called "Copenhagen interpretation," need not be considered in complete detail since it has been adequately treated elsewhere.[3] The related philosophical problems will be considered in a subsequent article. In both articles we shall attempt to separate the philosophical problems from their physical basis to the degree

that the matter permits, since we believe that such a separation is a prerequisite for clarification of this involved problem.

Early Development

Quantum theory has developed through a series of jumps, experimental and theoretical breakthroughs, which established new plateaus. Each jump was followed by a detailed examination of the new plateau and eventually, when it proved incomplete, a preparation for a new jump. The critical breakthrough which precipitated the conflicts on the nature of fundamental reality came with the simultaneous development of quantum mechanics and wave mechanics, which occurred, roughly, between 1924 and 1927. However, this

[1]Bohr first explained his views at a physics conference at Como, Italy, in September of 1927. This talk is reprinted in his *Atomic Theory and the Description of Nature: Four Essays with an Introductory Survey* (Cambridge: Univ. Press, 1934). One of Heisenberg's earliest explanations is contained in *The Physical Principles of the Quantum Theory* (Chicago: Univ. of Chicago Press, 1930). The latest and most complete exposition of each of these authors' views may be found in Niels Bohr, "Discussion with Einstein on Epistemological Problems in Atomic Physics," *Albert Einstein: Philosopher-Scientist* (Evanston, Ill.: Library of Living Philosophers, 1949), pp. 199-241; Werner Heisenberg, "The Development of the Interpretation of the Quantum Theory," *Niels Bohr and the Development of Physics*, ed. W. Pauli (New York: McGraw-Hill Book Co., 1955), pp. 12-30; Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science* ("World Perspectives," Vol. XIX; New York: Harper & Bros., 1958). Chapter viii of this last book is a slightly less technical version of the preceding account by Heisenberg.

[2]Eva Cassirer, "Methodology and Quantum Physics," *British Journal for the Philosophy of Science*, VIII (1958), 334-41, summed up the reaction of the participants in the Second International Conference of the Philosophy of Science (held in Zurich, 1954): "Complementarity was almost generally rejected as being unhelpful." A summary of many of the philosophical objections to this theory may be found in Mario Bunge, "Strife About Complementarity," *British Journal for the Philosophy of Science*, VI (1955), 1-12; 141-54.

[3]For concise, not overtechnical explanations of this doctrine see Norwood Russell Hanson, "Copenhagen Interpretation of Quantum Theory," *American Journal of Physics*, XXVII (1959), 1-15; Enrico Cantore, "Philosophy in Atomic Physics: Complementarity," The Modern Schoolman, XXXIV (1957); Philipp Frank, *Philosophy of Science: The Link between Science and Philosophy* (Englewood Cliffs, N.J.: Prentice-Hall, 1957) chaps. ix and x. A more technical treatment is given by Hans Reichenbach, *Philosophical Foundations of Quantum Mechanics* (Berkeley: Univ. of California Press, 1944), Pt. 1. A summary of this problem and his solution is contained in his posthumous work, *The Direction of Time*, ed. Maria Reichenbach (Berkeley: Univ. of California Press, 1956), sec. 25.

conflict can only be understood in the light of the development which preceded it.[4]

The earliest stages in the development of quantum theory—Planck's explanation of black body radiation (1900) and Einstein's explanation of the photoelectric effect (1905)—introduced an apparent contradiction into the description of light. Maxwell and others had successfully unified and explained all the known data on the basis of a wave theory of light. Planck's theory, as interpreted by Einstein, pictured light as a stream of photons and on this corpuscular basis explained new and otherwise intractable data. The further development of quantum theory by Debye, Bohr, and Sommerfeld did nothing to resolve this conflict.

Louis deBroglie's answer to this dilemma was a radical one.[5] Rather than resolve the duality, he extended it to mass particles (electrons and protons) by postulating that every fundamental "particle" was composed of a corpuscle plus an associated wave. Through this theory he was able to give an explanation of the apparently arbitrary principle (quantization of orbits) which had been used heuristically by Bohr to explain the structure and some of the properties of the atom. Schrödinger (1926) proved that the requisite conditions for the wave particle duality postulated by deBroglie could not be satisfied within the atom. He eliminated the corpuscular aspect and assumed that all the known and knowable particles were of a wave nature. On this assumption he developed wave mechanics, which proved an unprecedented success in solving the problems that perplexed his contemporaries.

Heisenberg, Born, and Jordan simultaneously and independently of

[4]A. d'Abro, *The Rise of the New Physics* (2 vols.; New York: Dover Pubns., 1951), Vol. II, gives a detailed semitechnical history of this development. A brief, popular, yet authoritative history of atomic theory may be found in Werner Heisenberg, *Nuclear Physics*, trans. F. Gaynor and A. von-Zepplin (London: Methuen, 1953). A historical account which stresses the problem of interpretation may be found in Max Born, *Physics in My Generation: A Selection of Papers* (London: Pergamon Press, 1956).

[5]Louis deBroglie explains the development of his own theory in *The Revolution in Physics: A Non-mathematical Survey of Quanta*, trans. Ralph W. Niemeyer (New York: Noonday Press, 1953).

Schrödinger developed quantum (or matrix) mechanics on a completely different basis.[6] Emulating and extending the precedent set by Bohr, Heisenberg totally rejected all physical models of atomic reality, such as waves and particles, and developed a mathematical formalism which used only observable quantities, such as frequencies and polarizations. His cumbersome mathematical methods did not facilitate the solution of practical problems as did the more flexible wave mechanics. Yet the two theories did not seem to lead to any contradictory conclusions.

In the summer of 1926 Bohr, as the elder statesman of atomic physics, invited both Schrödinger and Heisenberg to Copenhagen to discuss the new developments. Much to Schrödinger's displeasure, Bohr proved that the simple wave picture could not even explain the original work of Planck. Heisenberg's collaboration with Bohr proved more satisfactory. As Heisenberg later recalled:

> During the months following these discussions and intensive study of all questions concerning the interpretation of quantum theory in Copenhagen finally led to a complete and, as many physicists believe, satisfactory clarification of the situation. But it was not a solution which one could easily accept. I remember discussions with Bohr which went through many hours till very late at night and ended almost in despair; and when at the end of the discussion I went alone for a walk in the neighboring park I repeated to myself again and again the question: Can nature possibly be as absurd as it seemed to us in these atomic experiments?[7]

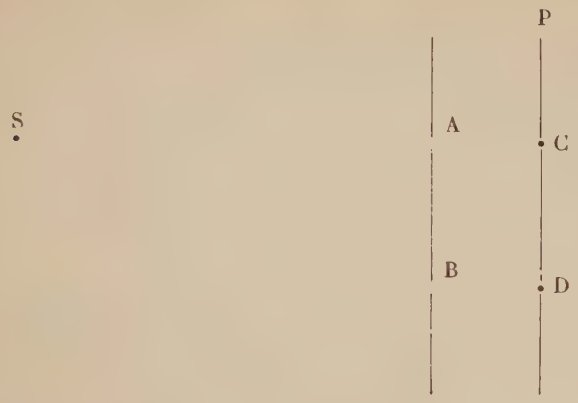
What were these experiments which seemed to demonstrate that nature was neurotic? A detailed explanation of some of them has

[6]Heisenberg gives an interesting nontechnical account of the genesis of his own ideas in *The Physicist's Conception of Nature*, trans. Arnold J. Pomerans (London: Hutchinson, 1958), pp. 51-71.

[7]Heisenberg, *Physics and Philosophy*, p. 42.

[8]Niels Bohr in *Albert Einstein*, pp. 210-30.

been given by Bohr.[8] Here we will give a sketchy explanation of the simplest of them.



A source, *S*, ideally an infinite distance away, projects electrons through the slits *A* and *B* and on to the photographic plate, *P*, where they are recorded by the spot produced. We consider first the results when slit *B* is closed. The spots have a symmetrical distribution about a point of maximum intensity, *C*, which is on a line with *A* and *S*. Are these electrons behaving as waves or particles? The laws proper to waves indicate that a wave passing through *A* would spread and could not produce a sharp point interaction. The occurence of such sharp interactions could be seen most clearly if the beam were weakened until one electron came through at a time and produced a single spot on the plate. If slit *A* is closed and *B* opened, a similar intensity pattern is found centered about the point *D*. Accordingly, only a particle interpretation seems tenable.

Now both slits are opened. We would expect a distribution of spots which would be the sum of the two preceding ones. This is not observed. Instead the photographic plate would reveal a series of bright and dark lines, an interference pattern similar to the beats produced by sound waves. If one attempts to explain this observation on a particle basis he must assume that the behavior of a particle passing through slit *B* depends on whether or not slit *A* is opened, an assumption which clearly seems to be unreasonable.

The difficulty illustrated by this experiment has been explained rather precisely by Reichenbach.[9] Calling "phenomena" the atomic facts which may be inferred rather directly—here the emission of electrons and their subsequent absorption at the plate—and "interphenomena" any explanation of the behavior of the particles between the coincidences which constitute the phenomena, he summarizes the two conclusions drawn from the experimental data. (1) One of the two proposed interphenomena (particles and waves) can explain *any* possible experiment. (2) Neither of the two interphenomena can be used to explain *all* possible experiments without introducing causal anomalies.

To the nonphysicist, this dilemma may seem to be of trivial significance. To the atomic physicist it is quite serious. The ultimate goal, the ideal towards which atomic physics had been striving, was an explanation of fundamental particles in terms of basic principles and of composite bodies in terms of the properties and activities of the particles which constitute these bodies. Accordingly, these fundamental particles, which are still but dimly understood, were thought to represent reality at its most basic level. As deBroglie expressed it:

> Nevertheless, it seems to me that one thing can be asserted: despite the importance and the extent of the progress accomplished by physics in the last centuries, as long as the physicists were unaware of the existence of quanta, they were unable to comprehend anything of the profound nature of physical phenomena for, without quanta there would be neither light nor matter and, if one may paraphrase the Gospels, it can be said that without them "was not anything made that was made." [10]

Hence the magnitude of the crisis. As long as quantum theory remained a thing of rags and patches nature was not understood. A unified view was needed before the new plateau could be properly explored.

The Copenhagen interpretation of quantum theory born of the collaboration of Bohr and Heisenberg developed along two different but related lines. Bohr tried to work the new pictures obtained by wave mechanics into the interpretation of the theory in an acceptable

[9]Reichenbach, *Philosophical Foundations*, pp. 1-42.

[10]DeBroglie, *Revolution in Physics*, p. 14.

way. This was not an attempt to build a constructural model of an atom. Rather, it was motivated by his realization that, however far the phenomena to be explained may transcend the scope of classical physical explanation, the account of all evidence must be expressed in classical terms. The successful development of quantum theory on the basis of evidence obtained from classical instruments indicated that the notions proper to classical physics must have some validity when applied to the phenomena measured by these instruments.

Bohr's analysis of actual and possible experiments led to two conclusions which concern us here. The first is the *indivisibility of atomic phenomena*. This conclusion is based on the realization that the atomic system to be studied is interacting on an atomic level with the experimental apparatus and thus destroying the clear-cut distinction between the process of observation and the thing observed—or, in Bohr's terms, between the subject and the object. The whole experiment must be considered as an epistemologically irreducible unit. The significance of this "indivisibility" principle may be seen by considering the double slit experiment previously described. The question, "Which of the two slits does the electron pass through?" is an attempt to subdivide the phenomena observed. To ask such a question in a physically meaningful way one must change the experimental set-up; for example, by closing one slit. However, the question is considered meaningless when asked of the experiment performed with both slits open. In this way the previous difficulty is solved by simply legislating it out of existence with, according to Bohr, nature itself presiding as the legislator.

The second principle, *complementarity*, is closely related to the first. The dilemmas discussed at Copenhagen revealed an essential ambiguity in any attempt to apply conventional physical attributes to atomic objects. For example, to apply the concept of momentum one must use an experimental arrangement which measures momentum exchange. This momentum exchange prohibits precise localization of the interaction which supplies the experimenter with his information. In a similar way one can measure position only by destroying the possibility of measuring momentum. Accordingly, the two concepts, momentum and position, are to be considered as complementary

concepts. Though both are needed, no possible experiment can give a precise determination of both simultaneously.

The spontaneous objection to this doctrine is that it confuses the possibilities of measurement with the properties of the things to be measured. Though the precise measurement of a particle's momentum may destroy the possibility of measuring its location, one instinctively feels that before the experiment was performed the particle did have a location. It must have been somewhere. This difficulty is, in a peculiarly inverted way, the cornerstone of Bohr's theory. All knowledge of atomic behavior is rooted in experimental data. This data allows no possibility of using the concept "location" in a meaningful way without becoming involved in causal anomalies; for example, the way a particle goes through slit *A* depends on whether or not slit *B* is open. In terms of Bohr's principles this discussion of location—albeit an unmeasureable location—is a conceptual attempt to divide an indivisible phenomenon. The apparent contradiction involved in speaking of a particle without location is due to the use of the term "particle" beyond the limits set by the principle of complementarity. Under the circumstances, it would be preferable to use the term complementary to "particle"; that is, "wave." For wave phenomena —for example, a sound—localization has, at best, a rather vague meaning.

Heisenberg's contribution to the Copenhagen interpretation was of a more abstract nature. Bohr met the paradox of apparently contradictory experimental results by imposing severe restriction on the language in which these experiments could be described.

[11]The "experimental" derivation of the indeterminacy principle given by Heisenberg in *Physical Principles* has often led to the simplified explanation that the indeterminacy results from the fact that the experiment disturbs reality. Bohr has objected to this oversimplification on the grounds that it introduces a distinction between the observation and the reality observed.

[12]Born's theory is summarized in his Nobel Prize lecture, "Statistical Interpretation of Quantum Mechanics," reprinted in *Physics in My Generation*, pp. 177-88.

[13]Schrödinger still holds a modified form of his original wave theory. His present views are explained in "Are There Quantum Jumps?" *British Journal for the Philosophy of Science*, III (1953), 109-34, 233-42, and in *Scientific American*, CLXXXIX (Sept. 1953), 52. The "orthodox" answer to Schrödinger's objections is given in Born's article, "The Interpretation of Quantum Mechanics," *Physics in My Generation*, pp. 140-50.

[14]P. A. M. Dirac, *The Principles of Quantum Mechanics* (3rd ed.; Oxford: Oxford Univ. Press, 1957).

Heisenberg faced the problem of how to pass from an experimentally given situation to its mathematical representation. He solved this problem by reversing it. In conjunction with Pauli he developed a mathematical formalism (the representation of states by vectors in Hilbert space) and introduced the hypothesis that only those states which could fit into the formalism could occur in nature. This assumption led directly to the now famous "indeterminacy principle."[11] This principle focused Bohr's doctrine of complementarity into a sharp mathematical form which specified the maximum accuracy obtainable in the simultaneous measurement of position and momentum or other similarly related complementary concepts. Again, the paradoxes are legislated out of existence, but now by mathematical rather than linguistic laws.

The mathematical synthesis which Heisenberg strived for was furthered by other developments. Chief among these was the reinterpretation of Schrödinger's wave mechanics. Born (1926) showed how these waves could be interpreted as determining a probability distribution.[12] At the same time, Schrödinger and Eckart independently demonstrated that the mathematical formulation of wave mechanics is equivalent to the more involved matrix methods. Finally, Heisenberg and Kennard sounded the death knell of the original wave picture proposed by Schrödinger by proving that wave packets diffused in time and could not be considered to behave like small particles.[13] These separate elements were gathered together and harmonized in the monumental work of Dirac.[14]

The result of these labors is a complete consistent system which is capable, at least in principle, of answering all questions within its domain. By this statement we certainly do not mean that all questions concerning fundamental particles, for example, have been answered or are likely to be answered in the immediate future. What it does mean is that any proposed answer must, according to the Copenhagen school, be consistent with the formalism of quantum theory and be interpreted in the light of its principles. Accordingly, subsequent generations of physicists could content themselves with learning quantum mechanics and the rules for applying it, while almost completely ignoring the "philosophical" problems of interpretation. This, it

seems, is what the overwhelming majority have done. As Einstein noted in this connection ". . . only those who have successfully wrestled with the problematic situations of their own age can have a deep insight into those situations."[15] Accordingly, the philosophy of the Copenhagen interpretation and of quantum theory in general will be extracted from the writings of those who wrestled with this problematic situation.

Philosophical Problems

That the "Copenhagen Interpretation" is intended to be a philosophy as well as a physics seems clear from the statements of its authors. As Heisenberg summarized it:

> What was born in Copenhagen in 1927 was not only an unambiguous prescription for the interpretation of experiments but also a language in which one spoke about Nature on the atomic scale, and in so far a part of philosophy. . . . This was not, however, the language of one of the traditional philosophies, positivism, materialism, or idealism; it was different in content, although it included elements from all these systems of thought.[16]

This philosophy differs from traditional philosophies in its mode of expression and development as well as in its content. It is almost inextricably intertwined with the physics from which it springs and thus presents, for the philosopher of more traditional views, an elusiveness which is most frustrating. This interconnection is not unintentional. Behind it lies the contention that no one can logically accept the present quantum theory and deny the philosophical implications which flow from it.[17] The enormous success of quantum theory points to the conclusion that this sublimated physics is a

[15]Albert Einstein, "Reply to Criticisms," *Albert Einstein*, p. 665.

[16]Heisenberg, *Niels Bohr*, p. 16.

[17]This claim is most clearly seen in Heisenberg's refutation of those who claim to accept the physics of his theory but reject the philosophy (*ibid.*, pp. 17-23).

[18]Dirac, *Principles of Quantum Mechanics*, p. 5.

[19]Niels Bohr, "Can Quantum Mechanical Description of Physical Reality Be Considered Complete?," *The Physical Review*, XLVIII (1935), 696.

[20]Bunge, *British Journal for the Philosophy of Science*, I, 3, n.-1, gives a bibliography of the various articles in which Bohr defends this opinion.

scientifically proven philosophy. Under these circumstances any commentator who attempts to separate the philosophy from its physical basis runs the risk of distorting the mind of the authors of the theory. Nevertheless the risk must be taken.

Perhaps a general, though certainly oversimplified, statement of this philosophy could be that the "quantum philosophy" consists in translating the restrictions imposed upon physical theory into epistemological and metaphysical statements. The epistemological problem is the decisive one, since their metaphysics ultimately consists in a denial of the possibility of metaphysics. In a grossly oversimplified form the epistemological argument might run as follows. All knowledge comes through the senses—and the men under consideration (Bohr, Heisenberg, Pauli, Dirac, and to a lesser degree, Born) will admit of no knowledge essentially distinct from sense knowledge. The greatest refinement of sense knowledge is had in the experimental data of modern physics. This data manifests an intrinsic limit in the amount and type of knowledge which can be obtained. Hence it is literally meaningless to speak, in any way, of anything beyond these limits. This view has been succinctly expressed by Dirac: "Only questions about the results of experiments have a real significance and it is only such questions that theoretical physics has to consider." [18] A similar summary was given by Bohr:

> The extent to which an unambiguous meaning can be attached to such an expression as "physical reality" cannot of course be deduced from *a priori* philosophical conceptions but . . . must be founded on a direct appeal to experiments and measurements.[19]

This epistemology, a logical extension of sensism, plays a determining role in the "metaphysics" of complementarity. Only phenomena can be known; nothing more can be said to exist. Bohr has repeatedly explained that we cannot attribute autonomous physical reality (that is, a reality independent of the experimenter) to objects on the atomic scale.[20] Recently, Heisenberg has expounded this doctrine in a more philosophical tone. He distinguishes three types of realism—practical realism, dogmatic realism, and metaphysical

realism—by the following criterion.[21] One "objectivates" a statement if he claims that its content does not depend upon the conditions under which it can be verified. Practical realism assumes that there are statements that can be objectivated and that, in fact, the largest part of daily experience consists in such statements. Dogmatic realism, the working philosophy of prequantum physics, claims that there are no statements concerning the material world that cannot be objectivated. Finally, metaphysical realism goes one step further by saying that "the things really exist." Dogmatic realism falls with the quantum paradoxes. Metaphysical realism is equated with Descartes's doctrine on the *res extensa* and then simply dismissed by an appeal to Locke, Berkeley, and Hume.

Elsewhere, this doctrine of realism and objectivity is applied to atomic problems.[22] For an atomic system to be objective it must be completely isolated from the rest of the world. Any connection would introduce submicroscopic disturbances which, to an unknown degree, destroy the objectivity of the property in question. A measurement supplies just such a disturbing connection. Hence, a completely objective system can never be known. Is it real? The answer to this question must be sought in the sources of knowledge from which the term "real" gets its meaning. The real is that which can be known by the senses and, by extension, verifiable concepts which may be derived from sense knowledge. Such concepts can be verified of an atomic system only by destroying its objectivity; that is, by performing a measurement. Then the system becomes real but is no longer objective. In summary, an atomic system may be either objective (and "potential") or real, but not objectively real. Only macroscopic systems, which are not appreciably changed by observation, may be considered objectively real.

The metaphysical realist may be inclined to dismiss this doctrine as simply absurd. Yet two claims may be made in its behalf. First, the experimental data, the quantum theory that explains it, and the epistemology and metaphysics sketched above form a consistent system. Secondly, the quantum theory, in which this philosophy is embedded, has proved extremely successful. Any future theories must

[21]Heisenberg, *Physics and Philosophy*, p. 81.

[22]Heisenberg, *Niels Bohr*, pp. 25-28.

[23]The discussion between Bohr and Einstein at this conference is summarized by Bohr in *Albert Einstein*, pp. 211-24.

contain the present theory, at least as a limiting form. For these reasons this "quantum philosophy" seems destined to perdure. It must be taken seriously.

What criticisms should be brought against this theory? Rather than attempt an independent answer to the question we shall consider the chief criticisms which have been offered through the years and the responses which the defenders of the Copenhagen interpretation have proffered.

Conflict over Complementarity

The objections to this theory, like the theory itself, represent a mixture of philosophy and physics put forth by men who, for the most part, are professional physicists and amateur philosophers. Here, however, the relation between the two is even more confused. Many of the objections, implicitly based on what Heisenberg would call "metaphysical realism," were elaborated by men who explicitly denied the possibility of metaphysics. In their criticisms, the language of physics hovers over the problem of the real existence of the objects of physics. We shall present the objections, chiefly those of Einstein, and then try to extract the philosophical residue.

The trial by fire for the new theory came with the Solvay physics conference held in Brussels in October, 1927.[23] The older generation of physicists who had inaugurated the quantum theory (Planck, Einstein, vonLaue, Lorentz) strongly objected to the new proposed interpretation on the ground that it violated the very nature of a physical theory. Implicit in the methodology of classical physics, including the theory of relativity, were two requirements which any theory must satisfy. First among these is causality in the physicists's sense; that is, a subsequent state is determined by a preceding state. Second among the requirements traditionally imposed, especially on mechanical theories, is that such a theory must explain all phenomena as relations between objects existing in space and time. By discussing various possible experiments, Einstein, as the leader of the opposition, showed that the new theories, wave mechanics and quantum mechanics, could not satisfy these standards.

Bohr's reply, which was more fully developed later, was that since

these standards could not be met, the standards themselves must change to meet the new theory. Causality and space-time localization should be considered complementary and mutually exclusive aspects of atomic phenomena. There are exact laws of a causal form (the time-dependent Schrödinger equation) and there are space-time observations. But it is not possible to establish a one-to-one correspondence between the two. The relation is merely statistical. Implicit in this defense is a radically new idea of the very nature of scientific explanation. Science does not explain things or even give laws for the activities and properties of things. Rather, it serves to correlate the various observations which can be made. This distinction was of little significance as long as it could be held, at least in principle, that observation did not disturb the system being observed. In atomic physics the observed system and the observation fused into an indivisible unit, a phenomenon, and the distinction became crucial. Two years later Bohr explained this theory of physics a little more clearly:

> We meet here in a new light the old truth that in our description of nature the purpose is not to disclose the real essence of the phenomena but only to track down, so far as it is possible, relations between the manifold aspects of our experience.[24]

At the same conference the wave-particle theory made a last, rather desperate, stand.[25] DeBroglie had developed a "pilot-wave" theory which, he hoped, might unify the wave and particle aspects of quantum phenomena in a conceptual model capable of explaining the observed data. Pauli proved that this new theory violated the firmly established principles of special relativity. For this reason, and also because of mathematical difficulties in the theory, deBroglie abandoned the attempt to form unified models and capitulated to the Copenhagen school.

Einstein's criticism took on a sharper edge in the 1930 Solvay confer-

[24]Niels Bohr, *Atomic Theory*, p. 18.

[25]See deBroglie, *Revolution in Physics*, chap. x, sec. 6.

[26]This is summarized by Bohr in *Albert Einstein*, pp. 224-30. A dramatic nontechnical account of this debate is given by George Gamow, "The Principle of Uncertainty," *Scientific American*, CXCVIII (Jan. 1958), 51-57.

[27]It is of interest to note that Einstein obtained both of his relativistic formulas discussed here by similar thought experiments.

ence.[26] He argued that when the exigencies of the special theory of relativity were properly considered, the indeterminacy principle and the doctrine of complementarity do not constitute an absolute limit in the knowability of atomic phenomena. He proposed an ideal thought experiment, a light-tight box containing radiation and a clock which controlled a shutter capable of releasing a single photon. Through the clock mechanism the *time* at which the energy of the system changed could be precisely determined. By an ideally precise weighing of the box before and after the experiment, coupled with the famous relativity formula, $E=mc^2$, the *energy* change could also be precisely determined.[27] Yet the Copenhagen interpretation insisted that time and energy were complementary variables governed by an indeterminacy relation. They could not be precisely determined simultaneously.

After a hectic sleepless night Bohr returned to the conference with a detailed answer. By invoking the "principle of equivalence," the fundamental principle of Einstein's own general theory of relativity, he showed that an energy change in the system would change the rate at which the clock measured time. The resulting indeterminacy in time, coupled with the indeterminacy that, as he proved, must be found in the weighing, yielded the relation exactly as the indeterminacy principle required.

Since this time the claim of the Copenhagen school that their interpretation was able to present a consistent theory which could, at least in principle, explain all the then known data has not been seriously challenged to my knowledge. As Einstein himself later summarized the situation:

> It must be admitted that the new theoretical conception owes its origin not to any flight of fancy but to the compelling force of the facts of experience. All attempts to represent the particle and wave features displayed in the phenomena of light and matter, by direct course to a space-time model, have so far ended in failure. And Heisenberg has convincingly shown, from an empirical point of view, any decision as to a rigorously deterministic structure of nature is definitely ruled out because of the atomistic structure of our experimental apparatus. Thus it is

> probably out of the question that any future knowledge can compel physics again to relinguish our present statistical theoretical foundation in favor of a deterministic one which would deal directly with physical reality.[28]

This admission of Einstein does not mean, however, that the Einstein-Bohr conflict ceased. It merely changed form, coming slightly closer to philosophy. The Copenhagen school insisted that the limitations in the "knowability" of phenomena were determined by the very nature of the phenomena. Accordingly, the ψ-function, together with its statistical interpretation, offered an absolute limit to atomic knowledge. In this sense it could be considered exhaustive. This conclusion, proper to the formalism of a physical theory, was sublimated into the philosophical proposition that there was no atomic reality beyond that represented in the ψ-function. Einstein, together with Podolsky and Rosen, felt that the ψ-function was incomplete.[29] Certain aspects of physical reality, they insisted, must be considered real and yet could not be included in the present theory. As might be expected, they offered a criterion of physical reality based on a correlation with physical theory:

> If, without in any way disturbing a system, we can predict with certainty (i.e., with probability equal to unity) the value of a physical quantity, then there exists an element of physical reality corresponding to this physical quantity.

By applying this criterion of reality to yet another ideal experiment, the authors tried to demonstrate that both position and momentum

[28]Albert Einstein, *Out of My Later Years* (New York: Philosophical Lib., 1950), p. 109.

[29]A. Einstein, B. Podolsky, and N. Rosen, "Can Quantum-Mechanical Description of Reality Be Considered Complete?" *Physical Review*, XLVII (1935), 777-80.

[30]Niels Bohr, "Can Quantum-Mechanical Description of Reality Be Considered Complete?" *Physical Review*, LXVIII (1935), 606-702. A more theoretical explanation of the EPR experiment in terms of ensemble theory has been given by Armand Siegel and Norbert Wiener, "Theory of Measurement in Differential-Space Quantum Theory," *Physical Review*, CI (1956), 429-32. The alternative explanation proposed by W. Furry (*Physical Review*, [1936], 393, 476) that there is no correlation between the separated systems seems to have been disproved experimentally. See D. Bohm and Y. Aharonov, "Discussion of Experimental Proof for the Paradox ef Einstein, Rosen, and Podolsky," *Physical Review*, CVIII (1957), 1070-76.

[31]Einstein, "Autobiographical Notes," *Albert Einstein*, p. 89.

could be simultaneously *real*, though they were not simultaneously measureable. They considered two separate systems, I and II, which interacted for a time and then separated. By arguments which need not be recounted, they showed that it should be possible to measure the position of I and then, by means of the product wave function $\psi_{I,II}$, determine the position of II, *without in any way disturbing II.* By their criterion of reality, the position of II is real. Similarly, the momentum of II could be determined by measuring the momentum of I, again without disturbing II. Hence, they concluded, both position and momentum are simultaneously real in spite of the fact that they are not simultaneously measurable.

Bohr's reply[30] translated the general requirements of the EPR experiment into a system which, in principle, was amenable to precise measurement. An examination of the possible measurements which could be performed on the system revealed that any measurement of the position of I would destroy all possibility of determining the momentum of II and vice versa. He concluded that their criterion of reality was essentially ambiguous when applied to atomic systems. They spoke of measuring I without in any way influencing II, whereas the very conditions that made a measurement of I possible necessarily exerted an influence on II. In spite of the separation of the two systems, the experiment as a whole must be considered one indivisible phenomenon.

A study of both papers leaves one with a rather frustrated feeling. Either paper, considered by itself, seems correct. When viewed together they do not quite meet, in spite of the apparent clear clash. Both are trying to establish the relationship between physical theory and the things observed; that is, physical reality. Yet each would define both terms of the relationship differently. Bohr, as we have seen, considers physical theory to be essentially a means of correlating observations, while "physical reality" is practically equivalent to the resulting correlation. Einstein's conception of the nature of physical theory is, by his own admission, derived from his own work in general relativity and field theory.[31] By this standard any theory which is not a representation of things in space and time must be

considered incomplete, though it may represent the maximum utilization of available information.

His ideas on "physical reality" are of more interest to us.[32] Though he finds it impossible to give a critical justification of his stand—without exhuming the dead bones of metaphysics—he holds for a distinction between an "objective" and a "subjective" factor in knowledge, even on the atomic level. If one can admit such an objective element—that is, a *Ding an sich* which is really out there—the philosophy of Bohr and Heisenberg, a repudiation of such objective reality, must be incorrect.

Plausible as this stand may have seemed on intuitive grounds, Einstein found himself in extreme difficulty every time he tried to present a critical defense of it. Each of his many attempts to construct verifiable statements about the "objective" element in atomic reality had met with frustration. Any attempt to construct metaphysical statements about atomic reality was precluded by his epistemology, the doctrine that concepts and propositions get meaning only through connection with sense experience.[33] There remained only the hope, poignantly expressed, that future physicists would be able to verify his intuition of reality:

> Some physicists, among them myself, can not believe that we must abandon, actually and forever, the idea of direct representation of physical reality in space and time; or that we must accept the view that events in nature are analogous to a game of chance. It is open to every man to choose the direction of his striving; and also every man may draw comfort from Lessing's fine saying, that the search for truth is more precious than its possession.[34]

[32]Einstein, "Reply to Criticisms," *ibid.*, p. 673.

[33]*Ibid.*, p. 13.

[34]Einstein, *Out of My Later Years*, p. 110.

[35]Heisenberg, *Niels Bohr*, gives a brief outline and refutation of each of the theories that disagrees with his own. A synthesis of the work done on the "causal interpretation" of quantum theory together with a complete (as of 1957) bibliography may be found in H. Freistadt, "The Causal Formulation of Quantum Mechanics of Particles (The Theory of deBroglie, Bohm, and Takabayasi)," *Nuovo Cimento Suppl.* (Ser. 10), V (1957), 1-70.

[36]David Bohm, "A Suggested Interpretation of the Quantum Theory in Terms of 'Hidden Variables,'" I, *Physical Review*, LXXXV (1952), 166-79; II, *ibid.*, 180-93; "Reply to a Criticism of a Causal Re-interpretation of the Quantum Theory," *ibid.*, LXXXVII (1952), 389-390; "Proof that Probability Density Approaches $/\psi/^2$ in Causal Interpretation of the Quantum Theory," *ibid.*, LXXXIX (1953), 458-66.

What conclusions may be drawn from this long, involved controversy? One hesitates to arbitrate this war of the giants; yet certain points seem to be fairly well established. First among them is the realization that the Copenhagen interpretation forms a complete consistent system capable of integrating, at least in principle, all of the atomic facts which are now known or which are likely to be discovered by an extension of the present theoretical and experimental methods. Many physicists share Einstein's hope that a better system may be found. Few, if any, would deny the success of the present system at least as a minimal interpretation. Secondly, the peculiar philosophy of Bohr, Heisenberg, and others, a sort of "semi-idealism" which holds that macroscopic objects are real but that submicroscopic objects become real only through being observed, is not based merely on a repudiation of metaphysics. It relies on the fact that any attempt to make meaningful statements about the behavior of an atomic system between observations must lead to contradictions. Thirdly, the problem of the nature of atomic reality is, at least in the literal sense, a "meta-physical" problem, since the problem of existence is beyond the scope of physics. This is indicated by the fact that both sides agree on the pertinent data and the mathematical formalism which describes it, while they are in complete disagreement on the reality described. Obviously, such a metaphysical problem cannot be solved by those who deny the possibility of metaphysics or by those whose philosophy is simply a linear extrapolation from physics. Finally, any metaphysical realist who treats this problem must be prepared to render a critical justification of his privileged information, a justification which physics proved incapable of rendering.

Before concluding this survey we must mention, at least briefly, the recent flurry of proposed alternative interpretations of quantum theory.[35] Chief among them, the source and inspiration of the others, is Bohm's interpretation of quantum mechanics in terms of hidden variables.[36] Through extended discussions with Einstein, Bohm became dissatisfied with the Copenhagen interpretation and began a critical re-examination of the foundations of quantum theory. He discovered that a suitable substitution could split the Schrödinger

equation into two equations, one of which could be interpreted as describing the trajectory of a particle provided the conjugate equation is interpreted as an equation governing the behavior of a new unobserved quantum potential energy.[37] A similar idea had been proposed earlier by deBroglie and abandoned because it seemed to lead to inconsistencies. By carrying the "hidden variable" theory to its logical conclusion and introducing a new theory of measurement, Bohm demonstrated a way in which these apparent inconsistencies could be reconciled with the observed data.[38]

Rather than extend this article by a discussion of inappropriate

[37]The substitution $\psi = R \exp(2\pi iS/h)$ is made in the Schrödinger equation. The resulting equation for S may be interpreted as a Hamilton-Jacobi equation, provided the equation for R governs the behavior of a new quantum potential energy, U. DeBroglie had developed similar equations in 1927 but abandoned them because of difficulties in their mathematical formulation. Bohm's new theory of measurement seems to solve, or at least cover over, these difficulties. See Bohm II, Appendix B (*Physical Review*, LXXXV, 180-93).

[38]David Bohm, *Causality and Chance in Modern Physics* (New York: Van Nostrand, 1957), chap. iii, gives rather convincing arguments to prove that the Copenhagen interpretation is not the uniquely possible interpretation of quantum mechanics.

[39]Heisenberg, *Niels Bohr*, claims that Bohm's theory may be considered to be the Copenhagen interpretation expressed in a different language. Such a statement can be defended only on strictly positivistic grounds. It really sidesteps the main point of the new interpretation, its causal determinism.

[40]We have deliberately omitted a mention of von Neumann's famous proof that the Copenhagen interpretation is unique, since his assumptions do not seem to apply to the hidden variables postulated by Bohm and others. This is discussed in Bohm, II sect. 9. See I. I. Zinnes, "Hidden Variables in Quantum Mechanics," *American Journal of Physics*, XXVI (1958), 1-4, for an explanation of von Neumann's theorem and its assumptions.

[41]Heisenberg rejected this theory on the ground that it destroys the symmetry of the quantum equations, which he considers an essential part of the quantum theory. The implausible conclusions which we had in mind are first the quantum potential itself. As Bohm and Aharanov (*Physical Review*, CVIII, 1070-76), used it in explaining the ERP paradox the quantum potential between two photons is strong enough to determine the polarization state at a distance of several feet. It should be noted that this "explanation" violates the most essential condition of the original experiment, the requirement that a measurement in System I does not affect System II. Secondly, the proposed instantaneous interaction violates one of the basic postulates of special relativity. Bohm's answer, that the interaction cannot transmit a signal, does not seem to be consistent with the causal interpretation, since the quantum interaction signals the polarization state of one of the two photons. Finally, his theory leads to results which do not seem physically reasonable. The velocity of the unobserved particle varies from zero (for states with zero angular momentum) to infinity (for certain types of double slit experiments). However, the basic objection to the theory is the one mentioned in the text; it is a completely gratuitous theory which has no experimental verification.

technical details, we will, rather arbitrarily, present our own view on the present status of Bohm's theory. There are two points to be considered. First, the question, Is the Copenhagen interpretation the only possible interpretation of quantum theory? Bohm's detailed treatment of this point seems to show that any such assumption is unwarranted. That is, the assumption that there can be no more to atomic reality than is included in the formalism of quantum theory is based on the same positivistic limitation of scientific theory to explicit evidence that led Mach to deny the existence of atoms. Bohm, at least in his later works, presents his own hidden variable theory as an illustration of a possible alternative explanation of quanta. By its very construction and the interpretative postulates introduced, it is mathematically equivalent to the standard theory.[39] That such a theory can succeed at all seems to be proof enough that the Copenhagen interpretation is not the uniquely possible explanation of the facts.[40] On the other hand the fact that the new theory is self-consistent and mathematically equivalent to the established theory does not guarantee its reasonableness as a physical theory.

The second point, clearly a matter of opinion, is the success of Bohm's theory precisely as a physical theory. Because of the arbitrary foundation on which it rests, the purely gratuitious assumptions introduced, the highly implausible conclusions that result from it, and the complete lack of corroborating evidence we must conclude that his theory, in its present from, is unacceptable.[41] Bohm, and the other "causal theorists" keep promising new improved versions which, they hope, may contribute to a clarification of the difficulties in the present quantum field theories. Until and unless such promises are fulfilled, the Copenhagen interpretation will remain the "orthodox interpretation" of quantum theory.

Conclusion

The Copenhagen interpretation is an interpretation of quantum theory developed by Bohr and Heisenberg and extended by Born, Pauli, Dirac, and others. In spite of a long history of formidable opposition, it has been generally accepted as a self-consistent, physical, reasonable way of interpreting the known data on atomic and sub-

atomic phenomena. Its essence, as a *physical* theory, involves a reinterpretation of the purpose and program of physics. Formerly, physics was expected to give a causal explanation of the behavior of objects chiefly in terms of space and time variables. The new physics uses these variables, but in a different way, as a means of correlating the observations that can be made.

For macroscopic objects the distinction is inconsequential; for submicroscopic events it is critical. Here the very observation—that is, the phenomenon observed considered as an irreducible unit—is the thing which science must explain. Any attempt to go beyond this by introducing a distinction between the observation and the object observed inevitably leads to causal anomalies when one tries to make meaningful (that is, capable of being verified, at least in principle) statements about the behavior of the object. Hence, Bohr concluded, any attempt to construct precise conceptual models of objects must be abandoned as a matter of principle. However, imprecise models,—for example, particles and waves—may be used within certain limits. These "pictures" are allowed and to some extent necessary, not to slake a metaphysical craving but to supply a means for applying the ordinary concepts and language on which understanding depends. From this understanding a complete quantum theory has been developed. Consequently, post-Copenhagen physicists can concentrate on the mathematical formalism and its applications, and completely prescind from the semiphilosophical problems of interpretation.

The *philosophical* conclusions drawn from this theory, and apparently underwritten by its overwhelming success, are really nothing but a restatement of the physical principles in philosophical language. If one had to pin a label on this philosophy, it might be classified as a semi-idealistic metaphysics coupled to a positivistic theory of knowledge. That is, beyond the atomic phenomena there is nothing else. No meaningful way to speak of atomic objects or "things in them-

[42]Henry Margenau, *The Nature of Physical Reality: A Philosophy of Modern Physics* (New York: McGraw-Hill, 1950), p. 12, has given a vivid description of the confusion of physics with metaphysics that is sometimes encountered: "Many reputable scientists have joined the ranks of the exterminator brigade, which goes noisily abroad chasing metaphysical bats out of scientific belfries. They are a useful crowd, for what they exterminate is rarely metaphysics—it is usually bad physics."

selves" can ever be found. These philosophical conclusions rest on two submerged but necessary assumptions.

The first assumption is that the Copenhagen interpretation represents an inherent limitation in knowledge which future generations of physicists will never be able to by-pass. Bohm and others have shown that this is an assumption and not a necessary consequence of the theory. The history of science teaches that few prohibitions limiting future scientists to the then current limitations have proved successful. However, it must be admitted that nothing in the present development of physics indicates that a return to a deterministic physics is likely. The opposite, a further departure from classical ideals, seems much more probable.

The second assumption is that metaphysical statements about atomic phenomena are meaningless. Apart from the general tenor of positivism, two reasons may be given for this rejection. The first is a misunderstanding, partial or total, of the nature of metaphysics.[42] Metaphysical statements, according to this misinterpretation, are statements that go beyond the available evidence. An example would be a statement of the behavior of "observed" particles between observations. The second and more basic reason is epistemological. The Copenhagen theory, as Bohr sees it, represents a rational utilization of *all* possibilities of unambiguous interpretation of measurement. Accordingly, he envisions no grounds on which further pertinent statements of any sort can be based. Implicit in this, to be sure, is a rejection of any distinction between fundamentally different ways of knowing. The metaphysical realist, the man who, according to Heisenberg's thumbnail sketch, holds that "things are really there," must be prepared to give some sort of an answer to such elementary and obvious questions as: "What is really there?" and "How do you know?" We hope to treat these problems in a subsequent article.

(Continued from p. 36.)

Congress has a program of intellectual co-operation under which foreign philosophers have been invited to lecture in Indian universities with the help of the governments of the countries concerned. Visiting American Fulbright scholars attend its sessions and contribute much to the discussions. For the past three years a delegation of Soviet philosophers has attended, thus giving its sessions a world-wide aspect. Mr. Nikunja Vihari Banerjee, Professor of Philosophy at Delhi University, presided over this year's session. He discussed perceptual knowledge as an ultimate datum, standing in no need of explanation and giving rise to no philosophical problem worthy of the name. Professor V. V. Akolkar of the Amaravati University, in his presidential address to the section on psychology, showed that the findings of modern psychology agree very well with the psychological systems of Indian philosophy. There were other presidential addresses to the sections on the history of philosophy and metaphysics, dealing, respectively, with the historical evolution of metaphysical logics and the value considerations of various systems of epistemology. All in all, some fifty papers were read and discussed. Ten of these were published in the "Proceedings" of the congress.

An Institute in Logical Theory was presented by Georgetown University from June 13 to July 23. The institute was offerred to call the attention of teachers of logic to two important recent developments in logic: the development of mathematical logic with its beginnings in Boole and Frege and its growth in Russell, Whitehead, and others; and the revaluation taking place as regards the nature of both Aristotelian and medieval logical theory. The visiting lecturers were Irving Copi, of the University of Michigan; Henry Veatch, of the University of Indiana; and Otto Bird, of the University of Notre Dame.

The Japanese Society of Medieval Philosophy has published the second volume of its *Studies in Medieval Philosophy*. Founded eight years ago, and now numbering more than two hundred members, this society encourages medieval studies in Japan by fostering communication with European specialists of the Middle Ages and in facilitating publication in works devoted to this period. The society is one of the most vital and important among Japanese academies. The task of translating the technical terminology of medieval philosophy into Japanese is, admittedly, almost insuperable. Yet these publications of the society constitute an impressive beginning. They are, moreover, an instance of actual communication between Eastern and Western thinkers in a common philosophy.

The Second Annual St. Augustine Lecture was held at Villanova University on April 24. Under the general title, "St. Augustine and the Augustinian Tradition," this series of lectures is intended to contribute significantly to a fuller understanding of the personality, doctrine, and influence of St. Augustine in the history of ideas. This year's speaker was Dr. Raymond Klibansky, Professor of Philosophy at McGill University, Montreal.

The Aquinas Lecture for 1960 was delivered by Professor Victor M. Hamm of Marquette University. Its title was "Language, Truth and Poetry."

The Eleventh Annual Meeting of the Metaphysical Society of America was held at the University of Notre Dame, March 18 and 19, 1960. On Friday afternoon, a panel under the chairmanship of Charles Hartshorne (Emory University) discussed "experience." The first member of the panel, Alan Pasch (Ohio State University), introduced the question. He concentrated on the presuppositions which philosophers make when they approach this topic and singled out sensationalism for making unduly limiting presuppositions. Under this heading, however, he included indirectly most empirical approaches. Herbert Spiegelberg (Lawrence College) gave a phenomenological account of experience, centering his exposition on intentionality, transcendence, temporality, and the relation between experience and the experienced. John Yolton (Kenyon College) viewed experience as a kind of encounter and related it to biological and physical processes.

The presidential address was delivered after the banquet, the Reverend Leo R. Ward, c.s.c. (University of Notre Dame), serving as chairman for this session. The president of the society, Richard McKeon (University of Chicago), took as his topic "Being, Existence, and That Which Is." By the expression "that which is," he meant to translate the Greek *to on* and the Latin *ens*; by "being" he meant essence or substance, and by "existence" he meant the interaction of things in space and time. He contended that "that which is" was the notion that most adequately enabled a philosopher to solve the basic problems, whereas the notions of "being" and "existence" raised problems that they could not solve adequately. The discussion on this paper was led by the Reverend Robert F. Harvanek, s.j.

The plenary session on Saturday dealt with the categories; the chairman was the Reverend George P. Klubertanz, s.j. (Saint Louis University). The first paper, by John Herman Randall, Jr. (Columbia University), introduced the topic by giving a synthetic historical account of the use of categories by various philosophers, distinguishing the various functions assigned to the categories, from that of general pervasive traits of being to the Kantian

sense of a-priori forms. The second paper, by the Reverend Joseph Owens, C.SS.R. (Pontifical Institute of Mediaeval Studies, Toronto), examined the notion of category in Aristotle. The third paper, by Stephen Toulmin (visiting professor, Columbia University), presented the notion of category as this is used by contemporary analytic philosophers, in the sense of an interpretative scheme whose use is governed by the character of things and of our activities in dealing with them.

The session on Saturday afternoon dealt with values; its chairman was Newton P. Stallknecht (Indiana University). John E. Smith (Yale University) gave a pointed summary of an essay he had written for the Hazen Foundation dealing with the conditions for making sense in talking about values. He argued that value is not a simple fixed quality that could be intuited but implies a norm and a judgment; he also maintained that it is present in all experience and is not sharply distinct from fact. There were three commentators. William Gerhard (Brooklyn College) tried to give a foundation for value in the concern which the self has for the self it could be; Charles J. O'Neil (Marquette University) argued that value could not be based on law since law implies good as a prior element; Charner Perry (University of Chicago) argued that if values were not merely customs and attitudes, they were not beliefs either.

The University of Notre Dame has announced the publication of a new philosophical journal, the *Notre Dame Journal of Formal Logic*. Under the editorship of Boleslaw Sobocinski, of Notre Dame University, the first issue appeared in January, 1960. Other issues of the quarterly appear in April, July, and October. "The Journal will be devoted to symbolic logic and its applications, to metalogic, semantics, the foundations of mathematics, to the history of logic and to fields immediately related to logic." Subscription price is $6.00 a year.

The Leicester University Press, under the editorship of Professor P. H. Nowell-Smith, last January began to publish a new quarterly, *Philosophical Books*. "The purpose of this periodical is to provide up-to-date information about books on philosophy published during the preceding period. Reviews will be from three hundred to fifteen hundred words in length and their purpose will be to provide information about the content and style of the books rather than critical discussion." Unfortunately the selection of books will be confined to those available in the United Kingdom, although the quarterly hopes "at a later stage" to extend the range of the books. The subscription rate is $2.00 a year or fifty cents a copy. Issues will appear in January, April, July, and October.

The University of Chicago Press published last January its first issue of *Midway*. It is described as "a scholarly magazine edited for the general reader" and ranges over all the fields of the arts and sciences. Its special purpose is the reader's "instructive entertainment." In the first issue a famous psychoanalyst (Frieda Fromm-Reichman) examines the forms of loneliness, a neurosurgeon asks what and where the soul of man is, and a research psychologist (Arthur Gladstone) tells us why everybody needs an enemy. There are some poems by John Logan. Subscription price is $3.50 for one year.

The Reverend I. M. Bochenski, o.p., of the University of Fribourg, will be a visiting Rose Morgan Professor at the University of Kansas during the fall semester, 1960.

The Philosophy of Science Institute of St. John's University will treat this year of the philosophy of biology. Four guest lecturers are on the program. Dates and titles of their papers are: October 15, "The Evolution of Method in Biology," by L. P. Coonen; November 12, "Aristotle's Anatomy of Mind," by Charles De Koninck; December 10, "What is Biology's Starting Point?" by Kurt Goldstein; January 7, "Evolution: Its Scientific and Philosophical Dimensions," by the Reverend Raymond J. Nogar, o.p.

THOMAS LANGAN, *Indiana University*

The Triumph of Subjectivity: An Introduction to Transcendental Phenomenology. **By J. Quentin Lauer. New York: Fordham Univ. Press, 1959. Pp. ix + 185.**

Father Lauer's Sorbonne thesis, *Phénomenologie de Husserl*, perplexed some of Husserl's disciples by its relentless insistence on the master's transcendental idealism. In view of the reaction in some quarters, I was curious to know whether Father Lauer had softened his stand in this new work, which is not, by the way, a mere rewrite of the thesis but a rethinking in English of his earlier French research. Father Lauer has not budged an inch. He still interprets the continual evolution in Husserl's thought as the movement of an idealism gradually taking a more explicit possession of itself. Father Lauer summarizes Husserl's contribution to the idealist tradition in these terms:

> It has been said, not without justification, that Kant rediscovered Plato and re-expressed Plato's ideal forms in terms of subjectivity. It might, with equal justification, be said that Husserl rediscovered both Plato and Kant, seeking to express the positions of both in terms of constituitive intentionality. Plato saw essences as necessary and immutable; Kant strove to explain their necessity and immutability in terms of a formal subjective *a priori;* Husserl sought to achieve the same goal in a framework of formal *and* material *a priori*. Plato had recognized that, if there is necessity at all, it belongs to the ideal order. Kant has specified the ideal order as belonging exclusively to subjectivity and its necessity as attaching solely to the formalizing function of reason. Husserl sought to extend necessity from form to content, thus apriorizing the whole of knowledge—content as well as form.[1]

Husserl, then, remained utterly faithful to his original Cartesian vocation (did he not, late in his life, choose for his Sorbonne lectures the title *Méditations cartésiennes?*) of searching for a way to extend to the whole of human inquiry the scientific rigor enjoyed so preëminently by the mathematics he had first pursued in the university. The purpose of

[1]P. 79.
[2]P. 143.
[3]*Ibid.*

science is to *guarantee* the objects of consciousness. By the time Husserl wrote the *Formal and Transcendental Logic* he was coming to realize what had to be done in order to uncover the ultimate ground of any and all of consciousness' objects. Without the constitutive activity of the subjectivity there would be no objects at all. If there are to be certain scientific objects these will owe their status *as* scientific, as well as everything else about them, precisely to the way they have been reconstituted. Husserl can say, therefore, that those objects have achieved the status of scientific which have been properly constituted according to the canons of reason. "The supreme guarantee of truth is the assurance that a judgment has been commanded by reason; such a judgment cannot be erroneous—if it were it would not be a judgment of reason."[2] But can we determine that a particular judgment is a judgment of reason? Husserl is persuaded that we can, that there are laws of rational constitution, and that phenomenology can and must discover and explicate these laws. Husserl was convinced that by the end of his life he had made an important contribution to the explicitation of those laws. Such an endeavor alone is worthy of the name of philosophy, for it alone achieves something permanent. Lauer explains,

> Certitude, of course, demands an assurance of permanence, and no factual judgment simply as such contains within itself this assurance. Permanence can be secured only by inclusion in the sum total, which by its totality is endowed with permanence. Such a totality is the pure transcendental subjectivity, the ultimate guarantee of reason itself—not in the sense that there has to be a guarantee that reason is infallible in its operation, it is that by definition, but in the sense that we must be sure that it is reason which is in operation. This assurance is to be found only in the complete grasp of that whole which is subjectivity.[3]

That is why the later Husserl devoted himself so much to disengaging the outlines of the structure of that "whole" which is the subjectivity. Husserl was not basically concerned to guarantee particular truths or to describe particular phenomena of consciousness but to achieve those basic discoveries about the consciousness' "making being *be*" that had to be secured before any particular truths could be established on an ultimately unshakeable foundation. As Husserl began gradually to realize that *time* was the essence of consciousness' over-all structure, he not only continued to advance the phenomenological unveiling of consciousness as the only meaningful form a higher wisdom can take, but he moved dangerously close to degrading the importance of the *matter* that is to be found in such a temporal consciousness. Feeling secure in his bastion of a thoroughly described formal consciousness, Husserl could afford to flirt with an

empirical relativism. Every perception is subject to subsequent correction by following perceptions, and the only validity a sensation can enjoy is one of permanence, as Father Lauer says, meaning it must be continually taken up again and corroborated by the continuing moments of the stream of experience. Along with this destruction of any possibility for sensation to be a path to a content of eternal truths, goes, as one might expect, a frank upgrading of practical truth. We read in the *Formal and Transcendental Logik*:

> *Every* real truth without exception (be it daily truth of the practical life, or truth of the sciences, no matter how highly developed) remains by essence in *relativities* which can be related normatively to *regulative ideas*. The merchant has his market-place truth; is it not in its sphere a good truth and the most useful to the merchant?[4]

A text such as this suggests that there is good reason for Lauer's prosecution of the great phenomenologist under the charge of subjective idealism. That Father Lauer's portrait of Husserl as a constitutive idealist makes clear this tendency or, if you prefer, danger, lurking in Husserl's thought even the most realistic interpreter of phenomenology will have to concede. But with this mighty blast the battle over interpreting Husserl has not yet come to an end. Just in the last spring issue of this journal we read Jean Ladrière's assurance that Husserl had confessed in the *Krisis* (to which terminal work Lauer gives short shrift) to "leading us too quickly (in the *Ideen*) to the Ego and of putting us in front of a subjectivity which is apparently void of any content."[5] The texts of the *Krisis* authorize an interpretation in which the earlier reduction to the transcendental ego is to be identified with the *Krisis' epoche* which reveals the full splendor of the *Lebenswelt*. According to this interpretation, then, what Husserl finally came to was indeed a constitutive transcendental Ego, but he discovered that what this Ego really constitutes is the full "lived world" in which it discovers itself as part of a reality which it does not create and upon which it in fact depends. The world can only *be* by being known; but when it is known, it is in such a way that it reveals itself to be ontologically prior; it reveals itself as the source of the individual subject.

The now familiar spectacle of the collision of respected interpreters over the ultimate sense of Husserl's philosophy has its origin, in my opinion, in a serious tension of contrary drives in Husserl's program. Husserl the empiricist, convinced of the importance of seeing things "as they really

[4]P. 245.

[5]Ladrière cites *Krisis*, p. 158 in The Modern Schoolman, XXXVII, No. 3, 180, n. 9.

are" and convinced that they really are as utterly individual events, moments in a continual flux of empirical experience, ironically begets Husserl the idealist, the critical philosopher, because his very empiricism leads him to reject any hope of discovering in "things" principles of a wisdom and therefore to seek the unity of "being" in the subjective unity of consciousness. The tension arises from an unresolved difficulty inherent in the empiricist-idealist position as such. Every step bringing the thinker closer to the subjective unity of experience is a step away from the "material" content of that experience, which is of no importance when "form" becomes the foundation of unity.

The clarity and the consistency of Father Lauer's book make it an excellent starting point for anyone wanting to enter this controversy (and the best statement of the interpretation of Husserl as an idealist I have ever seen). In view of the great problem of interpretation described above, it would be best to read it with a reservation in mind—namely that Father Lauer, in view of the position he is taking, very legitimately avoids taking pains to emphasize the elements in all of Husserl's works that remind us of Husserl the empiricist. Dialogue with this excellent statement of Husserl's penetration to the heart of the constitutive transcendental Ego demands we ascertain whether Husserl was able to reach a realism in the very bosom of this idealism. In this regard, two earnest questions need to be asked. Is Husserl's rediscovery of the Other from within the heartland of the ultimate reduction really convincing? (Lauer would have us rightly regard the "solutions" in the last *Cartesian Meditation* with greatest critical reserve.) Secondly, just what is Husserl's notion of the nature of the "thing" we are supposed to encounter in the critically-assured *Lebenswelt*? This last point of inquiry may lead us to discover that Husserl's empiricist presuppositions have survived all the wondrous mechanism of *epoche*, which, if so, would vindicate Lauer's brilliant attack on the pretensions of phenomenology to be "philosophy without presupposition."

The argument of the commentators over the "ultimate" meaning of Husserl turns on a single point. Was Husserl in his moment of supreme idealistic formalism, at the moment he focused most clearly on the transcendental Ego as constitutive of an experience according to the form of time, able to discover in the ecstatic horizons of subjective experience a material objectivity, the concrete richness of which then becomes the central concern of a human wisdom? Many will argue with Ladrière that Husserl's program never deviates from the great war cry of the *Logische Untersuchungen*, "To the Thing Itself," and claim that the whole critical process mounting through the progressive reductions of *Ideen I*, the *Formal and Transcendental Logic*, and the *Cartesian Meditations* is part

of an ultimate critique intended to liberate the "thing" from the limitations imposed by every presupposition, all of which is necessary because these is nothing more difficult and no effort needing more constant renewal than the return to the "thing." Texts like this one from the *Formal and Transcendental Logic* indeed manifest just this feeling:

> Judging in a naive evidence signifies judging on the basis of a giving of the thing 'itself,' and submitting oneself to the constant question, what must one 'see' there effectively and how can one succeed in expressing it faithfully; it is then judging with the same method used by the knowledgeable practical man when it is important to him to 'find out how things really are.' That is the beginning of all wisdom although it is not the end, and it is a wisdom with which one can never dispense, no matter how profoundly one may be engaged in theorization.[6]

VERNON J. BOURKE, *Saint Louis University*

Our Public Life. **By Paul Weiss. Bloomington: Indiana Univ. Press, 1959. Pp. 256. $4.50.**

From his student days onward, Paul Weiss has showed an interest in system. His present book (part of which comprised the Mahlon Powell lectures at Indiana University, 1958) offers a systematic framework for a but partly developed public philosophy for twentieth-century man. It is the work of a mature thinker and well worth careful reading.

While he insists that there is an important dimension of human life that is private and personal, Weiss here concentrates on certain stages in the group life of man. These are society, the state, culture, and civilization. The pattern is developmental. Weiss speaks (p. 17) of man moving, "out of inferior into better states of affairs, e.g., from conventional, traditionalized societies to states, to cultures, and then to civilization." Roughly, the first half of the book is devoted to man in society.

Strongly influenced by Plato, Weiss thinks that at least four classes are necessary to a mature human society: the "empowered," the "reasonable," the "prestigious," and the "productive" classes. What he seems to be saying is that the *Republic* has no class for Plato himself. The prestigious class is the subgroup of "priests and teachers, poets and sages." These are the bearers of the values of their society.

This discussion of human society introduces a lengthy exposition of

[6]P. 246.

man's rights, laws, and, in particular, natural law. Even positive law is taken to be "prescriptive"; it imposes quite real obligations, but backing it up is Natural Law (in capitals). Pithily put, "The law has to answer, sooner or later, to man's conscience" (p. 115). This is not to say that natural law is identical with the dictates of moral conscience. What Weiss does with natural law will commend itself, in part though not entirely, to Thomists. His natural law has four preliminary characteristics: it is natural, not supernatural; it is a work of nature, not of human effort; it is concerned with the public nature of man, not with his private acts; finally, it results from the operation of impersonal forces, is not the product of volition (see pp. 157-58). Though normative, it is not universal: there are different natural laws in different societies. Yet it is not "social law."

Now the difficulty with all this (as with most other theories of natural law) is that Professor Weiss knows what his natural law is, and he expects other members of his society to recognize it—but they don't. He is like an honest poker player clearly reciting the rules in a crooked game.

After the state and culture comes civilization. We haven't got it yet. The United Nations is confused and ineffective. Civilization would be the optimum development of all mankind in a functioning social group. It is refreshing to see this presented as an attainable ideal.

LOUIS A. BARTH, S.J., *Saint Louis University*

Philosophy and Linguistic Analysis. **By Maxwell John Charlesworth. "Duquesne Studies, Philosophical Series," 9. Pittsburgh: Duquesne Univ., 1959. Pp. xiii + 234.**

Can traditional philosophy find enrichment through contact with linguistic analysis as it has through its association with idealism and existentialism? This study, which is the author's doctoral dissertation at the University of Louvain, concludes on an affirmative note. Linguistic analysis has made the traditional philosopher reflect more critically on the nature and role of philosophy, and it has provided him with valuable philosophical technique. The young Australian philosopher develops this thesis earnestly in his sympathetic yet critical presentation of the origin and growth of analysis in Great Britain. To treat analysis as if it were a unified movement would be misleading and unprofitable; so the author studies each of the prominent philosophers individually, stressing what each has contributed to its gradual elaboration, and the result is an accurate and reliable account. The critical passages are written from an

internal viewpoint and, while fairly numerous, are not carping or rhetorical. Although the author is most concerned with establishing his conclusions, he has brought together a body of valuable information on linguistic analysis systematically and clearly stated. The work will serve admirably as an introduction to the analytic movement.

Linguistic analysis is often mistaken for logical positivism or some other form of empiricism by those unacquainted with it. The distinction between these various movements is insisted on, though it is admitted that analysts may hold some views in common with the positivists and empiricists. Though mathematical logic furnished concepts and techniques for analysis through the work of Frege, Russell, and Wittgenstein, the author disclaims any direct connection between them and generally tends to minimize the influence of logic on linguistic philosophy.

The appearance of G. E. Moore's "The Refutation of Idealism" in 1903 marks the beginning of analysis. In this essay Moore displayed his skill in using an unwonted method of philosophizing which was to prove a greater contribution to the growth of analytic philosophy than the theories he formed. Russell's place in the history of analysis is hard to overemphasize, for he gave the new movement a logical and epistemological grounding, bringing to it new technical concepts such as his theory of logical form, the theory of types, and the notion of the ideal language. In his research into the foundations of pure mathematics he had developed these theories, but he did not see their full application until he had ceased "taking language for granted." Today the octogenarian Russell maintains his hope in analysis as the one method for progress in philosophy, but unlike contemporary linguistic analysts he feels that philosophy should say something about the world. A more comprehensive view of his philosophy than the author has given would aid the reader in assessing Russell's real worth and the extent of his contribution. As it is, Moore receives more coverage than Russell.

Today's analysts are more concerned with Frege and Wittgenstein than with Russell. Although Charlesworth gives Frege only brief mention and does not present any of the leading ideas of the German mathematician and logician, he discusses at length Wittgenstein's *Tractatus Logico-Philosophicus* and *Philosophical Investigations*. He insists rightly that the eccentric Austrian was not a logical positivist though his writings are susceptible of such an interpretation. It is in the thought of Wittgenstein that linguistic analysis reached its mature development. To him the other analysts go for ideas and inspiration. For Wittgenstein all philosophical problems arise from the misuse of language, and when they are subjected to analysis they are seen for what they are, pseudoproblems. The function of philosophy is essentially critical and analytic; it points out the

structure of language in general, or it shows just what kind of language-game one is playing. Consequently philosophy is therapeutic and shows how ordinary language is correctly to be used. The author sees analysis assuming in Wittgenstein a philosophical neutrality which really constitutes its originality in the history of thought. Though the treatment given here does not have the profundity or the detail found in studies such as that of Miss Anscombe, it is to be recommended to all who seek help in reading Wittgenstein.

The logical positivist interlude, whose beginning was marked by the publishing of Ayer's *Language, Truth and Logic* in 1936, is interpreted as the crisis through which analysis had to pass in order to achieve self-realization. Ayer and all who were lured by the charms of verifiability from the path of true analysis have returned little by little, and analysis now recognizes its own nature.

Contemporary analytic philosophy both at Cambridge and at Oxford consists in a development of Wittgenstein's insights for the most part. John Wisdom and the Cambridge group have made therapy their cardinal idea. For them philosophical analysis, like psychoanalysis, proceeds by way of paradox; but it reveals to the mind what is hidden in the obvious experiences of life and thus leads it to a solution of philosophical puzzles. The clarification of linguistic misuses is only the beginning of philosophical therapy. The Oxford analysts, on the other hand, develop the theme of ordinary language. They think of meaning in terms of *use* and point to ordinary language as the criterion of significance.

Dr. Charlesworth concludes that the analysts are wrong in denying the reality of philosophical problems even though he agrees that some pseudo-problems may arise from the misuse of language. To view language as something apart from its function of meaning and to divorce meaning from what is meant is fallacious. This mistake has led to the attempt to "infer" from the structure of language to the structure of reality. Meaningful language is characterized by its extralinguistic reference, without which it has no significance.

Although the claim that philosophy is analysis and therapy is excessive, the author agrees that philosophy is partly analytic and therapeutic in its method. The method of epistemology is almost wholly so. Metaphysics as implicitly understood by Aristotle and St. Thomas has a method which is in part analytic, negative, and therapeutic. It is thought that we owe this new insight to linguistic analysis and that it is of importance. To maintain this, however, is not to rob metaphysics of its epiphanic nature; it still has as its primary function to illuminate the intelligible mysteries implicit in our daily experience. Charlesworth does not develop his reasoning sufficiently to be convincing. In view of the rather extensive controversy

among Thomists on the nature and method of metaphysics, a more profound and detailed discussion in needed. Perhaps the analysis and therapy allegedly practiced by the metaphysician are not properly metaphysical but rather preparatory to metaphysics in the sense of being linguistic and logical.

In Charlesworth's opinion linguistic analysis has made traditional philosophy and in particular Scholastic philosophy freshly conscious of the philosophical urgency of language taken precisely as an instrument of meaning. It is its reference to what is meant, the extralinguistic, that determines the meaningful use of language. The philosopher investigates the necessary conditions for the meaningful use of language and by doing so investigates the necessary structure of reality. Contemporary philosophers have called into question the use of subject-predicate expressions and favor relational propositions. If one should reason that subject-predicate expressions are indispensable in certain contexts, this is equivalent to saying that there are substances and properties. Though the existence of substance and properties is a metaphysical problem, it can be formulated in linguistic terms; that is, in terms of subject and predicate. The ontological formulation of the problem is in terms of substance and property. The advantage of the linguistic formulation is that it renders the problem more tractable.

Thomistic philosophers, among them Gilson in his *Being and Some Philosophers*, have recognized that the deepest metaphysical problems are involved in every-day language and that grammar is closely related to metaphysics. Between language and the extramental object there is knowledge in all its complexity. Charlesworth seems to simplify this bewildering complication and to push on to his conclusions too enthusiastically. To reassure he must make clear that he has successfully coped with the network of problems involved. Likewise he must overcome the impression that what he calls the investigation of the necessary conditions of meaningful language and the linguistic formulation of metaphysical problems leads not to an existential metaphysics but to an analysis of concepts. Despite these reservations the reviewer considers this study a substantial addition to the literature on the analytic movement.

CYRIL VOLLERT, S.J., *St. Mary's College*

The Phenomenon of Man. **By Pierre Teilhard de Chardin. Trans. Bernard Wall. With introd. by Sir Julian Huxley. New York: Harper & Bros., 1959. Pp. 318. $5.00.**

Among the hundreds of Teilhard's published and unpublished writings, ranging from brief technical articles that describe some newly discovered

fossil to volumes that treat of such mammoth problems as the origin, future, and final consummation of the universe, highest eminence is commonly assigned to *Le phénomène humain*. Although it was composed between 1938 and 1940, with supplementary material added in 1947 and 1948, it did not appear in print until 1956. Since then, in its original French or in translations, it has become one of the most discussed books of our time.

To do justice to the Jesuit paleontologist, to evaluate his work fairly, and to eliminate inept criticisms, we must note and keep in mind the position from which he regards man. The point of view is not that of metaphysics or theology. Teilhard de Chardin was neither philosopher nor theologian, but a scientist; he repeatedly cautions us that the book is to be read as a scientific treatise. He does not attempt to uncover ontological and causal relations among the elements of the cosmos but undertakes only to set forth experimental laws designed to express the successive appearances of those elements in time. To this end he has taken man as the center of the universe and tries to establish around him a coherent order between antecedents and consequents. Hence he leaves vast room for further studies on man from the angles of philosophy and theology; in fact, on occasion, he points out places where the philosopher or the theologian may conveniently step in to contribute refinements and complements of a higher order. Accordingly, he offers not a complete explanation of the world and of man but only an introduction to such an explanation. He acknowledges that his treatment may properly be designated as "hyperphysics" but insists that it is not metaphysics.

The very title of the book reveals its level and its scope. Man, as he occurs in history, is a genuine fact that falls, at least in part, within the range of science; and mankind as a whole is a phenomenon to be examined, analyzed, and described like other phenomena. A phenomenon is something to be observed; Teilhard endeavors to *see* man, to *show* what has happened to him when situated squarely within the framework of phenomena and appearances, and to *envision* what is to become of him. To behold man in this way, we must view him in the only perspective that will display him in his relationship to the rest of the cosmos; that is, in the perspective of evolution.

Animating Teilhard's quest is the desire to trace out the direction evolution has been taking since the very beginning and to discover the goal toward which the evolving universe and evolving life are converging. He believes that a scientific contemplation of phenomena discloses a definite orientation. His endeavor to discern the direction of evolution without appealing to metaphysical assumptions is one of his most original contributions to science. Once satisfied that he has discovered this direction, his

intention is to construct a spiritualistic evolution that will be more probable and more attractive than any materialistic theory. Unlike the champions of materialistic evolution, Teilhard explains the lower by the higher, matter and life by thought to which they tend, and thought by a final collectivity of human persons grouped about a hyper-personal and transcendent Center. He perceives the underlying dynamism of all evolution in the effort of consciousness, which permeates in an extremely diffuse and rudimentary way the primordial stuff of the universe, to construct increasingly complex organisms that seek, in their highest forms, an eventual liberation from matter. Owing to this force, nameless particles form atoms, which in turn form simple molecules; and the latter combine to form macromolecules. As evolution proceeds, a critical stage is reached after some billions of years; and passage to life is accomplished with the emergence of the first cells in the earth's seas. Rapidly the biosphere covers the planet; and more and more complex forms of life evolve, slowly groping upwards over the ages until the mammals culminate in the anthropoids.

The clue to understanding the direction of evolution is found in the gradual perfecting of the nervous system and the brain. Primates are interesting precisely because of their cerebralization. The process of specialization in limbs, teeth, and organs tended to imprison the horse, the stag, and the tiger, whereas the anthropoid remained malleable as his brain developed; evolution, we may say, went to his head. At length another critical point is crossed in a family of higher primates; thought is born and, without noise or fanfare, man enters the world.

With man, the "noösphere" or thinking layer of life begins. As the centuries pass, men multiply and group themselves into societies, which continue to develop in line with the laws of evolution. Here the author comes to the theme of his greatest interest; he ventures, by extrapolating his present reading of evolution into the far future, to predict the ultimate stage of human society. After a superorganism of humanity has evolved into a sort of vast collective person that does not destroy but perfects the individuals composing it, all men who co-operate in universal love with trends toward such unification converge upon an eternally pre-existing Center of attraction. This is the Omega Point which had guided the immense process from the beginning and which believers will have no difficulty in identifying with God. The materially exhausted planet dies; but "that percentage of the universe which, across time, space and evil, will have succeeded in laboriously synthesizing itself to the very end" achieves liberation in the last critical passage to a new form of life that is spiritual and immortal. "Not an indefinite progress, which is a hypothesis

contradicted by the convergent nature of noogenesis, but an ecstasy transcending the dimensions and the framework of the visible universe."

The grandeur of this vision can ill be conveyed in a brief summary which omits elaboration of details and step-by-step justification. It is undoubtedly one of the reasons for the enthusiasm aroused by the book. Teilhard leaves no one indifferent. Reactions have been both uncritical and hypercritical. Some of Teilhard's more ardent disciples regard his work almost as a sort of latter-day revelation of which every part has to be accepted with equal reverence and indignantly or scornfully repulse all adverse criticism. Others find fault at stages which, given the author's professed point of view, do not seem to be defective. Samplings of objections, whether justified or unjustified, may be briefly considered.

Teilhard has been reproached for fostering a neo-Pelagian theology to save the world by the natural forces of evolution. Of course he does no such thing. The unifyng power of universal love, which becomes increasingly important in the latter phases of the human solidarity he forecasts, is expressly distinguished from the "super-intimacy" with God, and consequently with our fellow men, that is effected by supernatural charity. When he appeals to the "Christian phenomenon" to identify the form human society will more and more assume, he is aware that he is surmounting the plane of scientific observation and that the unification of mankind is but a natural tendency which is divinely utilized as a preparation for constructing the mystical body of Christ.

The ancient and continuing conflict between Christ and Satan is admittedly not brought out in the book; Teilhard had no intention of writing a theological summa. Nor does he teach the great truths of redemption and grace, although his synthesis leaves full scope for them. He speaks very little of evil, especially moral evil, but he does allow for it on his phenomenal plane and even faces the possibility that the inherent trend of socially evolving mankind toward Omega may be thwarted by human refusal. Original sin cannot be discovered by positive science; yet Teilhard notes that the quantity and malice of evil spread through the world suggests an excess that is inexplicable unless the effect of some primordial catastrophe has modified the normal process of evolution.

No satisfactory theory of creation is proposed in the book, and no mention is made of a beginning. Teilhard observes that creation, as it appears on the experimental level, conveys the ideas of condensation, concentration, unification; on the same plane, no backward-limit to a given universe is discernible. This view is scarcely surprising to anyone acquainted with the position firmly upheld by St. Thomas, that even on the higher level of philosophy no absolute beginning of created being can be demonstrated.

Teilhard's law of complexity-consciousness, according to which consciousness appears more clearly with increasing complexification of material being, seems to be open to no devastating attack. Creation of the spiritual soul with the advent of hominization is not contested by Teilhard; on the contrary, when opportunity offers, he indicates precisely where, for reasons of a higher order, such a doctrine may fittingly be introduced. Man came so silently into the world that when science catches its first glimpse of him he is already represented by a host of individuals throughout the old world from South Africa to China. Whether mankind took its origin from a single human couple or from a number of pairs, Teilhard does not say because he cannot say; the question completely eludes the scientist and must be settled by recourse to a transexperimental source of knowledge.

The theory of the appearance and development of life proposed by Teilhard seems to stand or fall with his assumption of "prelife" and "elementary consciousness" existing at all stages, even the lowest, of rudimentary cosmic stuff. Scientists are justified it they remain dubious about this hypothesis or reject it outright; certainly it has not been experimentally confirmed. Philosophers are within their rights if they insist on a clean break between nonlife and life. They may argue that either this prelife is not life, and then evolution has engendered a radically new form; or else prelife is true life, and then subatomic prelife has only the aura of not being life, with the consequence that everything is alive. In this connection, mutterings of "panpsychism" have been heard.

Perhaps the most valid objection to Teilhard's procedures is advanced on the score of methodology. Even some critics who are not unfavorable to the general thesis of the book discern a certain confusion in this respect. Unconscious soarings into the realm of metaphysics and deliberate excursions into theology not infrequently raise the level of discourse beyond Teilhard's professed phenomenology. This flaw has been discussed at length, among others, by C. D'Armagnac in *Archives de philosophie*, XX (1957), 5-41, and by L. Malevez in *Nouvelle revue théologique*, LXXIX (1957), 579-99.

If *The Phenomenon of Man* is read at all, it ought to be read at least twice. After a first perusal, which will lay bare the theme and will make the terminology familiar, it should be read a second time with close attention to the scientific point of view aimed at by the author. Criticisms that may then occur will perhaps be more of a scientific than of a philosophical or theological order; quite possibly, most of them may simply evaporate. In any case, the reader will be in a better position to appreciate the reality, difficulty, and urgency of the problem, and also the scale and form of the proposed solution.

WALTER E. STOKES, S.J., *Oxford University*

The Philosophy of Whitehead. **By Wolf Mays. New York: Macmillan Co., 1959. Pp. 259. $4.25.**

The theme of Mays's interpretation of Whitehead's later philosophy is that "Whitehead's account does not seem to be as courageous nor as metaphysical as some philosophers have made it out to be, since what he seems to be doing is a sort of applied logic" (p. 20). Mays reduces the antitheses of the last chapter of *Process and Reality* between God and the world to two factors: the rational and permanent element in God and his primordial nature, which becomes a set of propositions of symbolic logic; and the experiential and temporal element in the world, which becomes the reification of the concepts of modern physics.

In this view, God in his primordial nature is the extensive scheme, an indeterminate and abstract pattern of logical relationships. Accordingly, the term "God in his Primordial Nature" refers to the *n*-adic ordering relation R, which is the logical framework in which events are related. And creativity becomes the field of force pervading space-time. Then, the coherent, logical necessary system in terms of which all experience is to be interpreted is the extensive scheme which becomes the cosmological scheme when determination is given it by the actual occasions of our present epoch.

Mays's position is that in the philosophy of organism Whitehead is largely manipulating abstractions and clothing them in concrete terms applicable to human experience in the manner of Lewis Carroll in *Alice in Wonderland*. This project involves two key notions: the postulational method of modern logic with its stress on complex relational systems and the field theory of modern physics with its stress on the historicity of physical systems. In fact, for Mays the philosophy of Whitehead's later period is the application of symbolic logic to reifications of notions of modern physics. For this reason, Mays charges that in spite of Whitehead's frequent warnings about the fallacy of misplaced concreteness, he does give a form of reality to the electro-magnetic field in the same way that the philosophers of the seventeenth and eighteenth century gave a physical reality to the physical concepts of that period.

Mays believes that this interpretation is based on evidence that is largely circumstantial, since it is based on attempts to set up correspondences between different parts of his writings. But he does offer one piece of direct evidence, Whitehead's remarks in reply to John Dewey at the American Philosophical Association in 1936. However, Mays overlooks Whitehead's explicit statement that symbolic logic has yet to be

applied to aesthetics, which at that time was considered by Whitehead to be the most fruitful starting point for philosophical generalization. On that occasion Whitehead declares, in terms of a program for the future, that symbolic logic may some day be the method of aesthetics, ethics, and theology. This is conditioned on the expansion of real variables beyond those of space, number, and quantity:

> We must end with my first love—Symbolic Logic. When *in the distant future* [italics mine] the subject has expanded, so as to examine patterns depending on connections other than those of space, number, and quantity—when this expansion has occurred, I suggest that Symbolic Logic, that is to say, the symbolic examination of pattern with the use of real variables, *will become* [italics mine] the foundation of aesthetics (Alfred North Whitehead, "Remarks," *Philosophical Review*, XLVI [March, 1937], 186).

Since Whitehead explicitly declares that, at the time that he is speaking, he considers aesthetics to provide the starting point for metaphysical generalization and observes that symbolic logic is not sufficiently developed so as to work with real variables in the area of aesthetics, it seems that Whitehead is talking in terms of a program for the future development of symbolic logic and philosophy.

Further, Mays's position that Whitehead is manipulating abstraction in a philosophical wonderland is not in keeping with Whitehead's own insistence on the concreteness proper to philosophy in direct contrast with the abstractness proper to science. Although Mays often seems to be conscious of the fact that he is wrestling with stubborn texts, he does not recognize that his root problem is to perceive the questions that Whitehead sets out to answer and their properly metaphysical setting. But in this tightly reasoned study, Mays does render the service of heightening awareness of the strong influence of mathematics and modern physics on Whitehead's answers to those questions. However, the reduction of Whitehead's metaphysics to applied symbolic logic is an extreme position that appears to be irreconciable with Whitehead's own statements concerning the nature of his metaphysical project.

LOUIS A. BARTH, S.J., *Saint Louis University*

A History of Ancient Philosophy. **By Ignatius Brady, O.F.M. Milwaukee: Bruce Pub. Co., 1959. Pp. xi + 261. $5.00.**

This is an undergraduate textbook, the first in a projected series of three volumes on the history of philosophy to be written under the auspices

of the Franciscan Institute of St. Bonaventure University. Though concerned chiefly with ancient Greek speculation it includes a section on ancient philosophy of the Near and Far East, referred to as "a prehistory of philosophy." After discussing the Greek philosophers the author departs considerably from the usual chronological divisions and adds a comparatively extensive discussion of oriental Scholasticism. The Muslim and Jewish philosophers are grouped with the ancients because they represent the Neoplatonic spirit and are closer dogmatically to the Neoplatonists than to their Christian contemporaries. So the volume begins with the ancient Eastern thought and ends with the death of Maimonides in the early thirteenth century. The second volume in this series will treat almost exclusively of philosophy as affected directly by Christian revelation. It will, however, touch again on the oriental Scholastics briefly "in order to avoid certain difficulties in the teaching of the history of philosophy." Needless to say there will be many who will debate the wisdom of this division of matter.

Father Brady has succeeded in writing a text for undergraduates which is intelligible and fairly easy to read. He has an eye for large trends in the history of philosophy and for generalizations which can benefit the undergraduate. For the most part he has avoided descending into details. This is understandable, but it has led to oversimplification and omission of rather important elements in the thought of more than one philosopher. A case in point is the theory of sense perception of Democritus, which is mentioned only in passing. In general the pre-Socratics are given too brief treatment. In addition to the testimony of Aristotle, more mention could have been made of the views of dependable secondary sources such as Burnet and Zeller and others.

Father Brady has chosen the Greek notion of *paideia* as a constant theme and relies heavily on Jaeger throughout his explanation of Greek philosophy.

In the section dealing with the thought of Plato the author takes the allegory of the cave from the *Republic* as being more or less representative of the substance of Plato's thought and in terms of it presents his explanation. In other words, the allegory serves as the framework around which Plato's thought is reconstructed. Although it would be an exaggeration and incorrect to say that he presents the "story-book Plato," too little attention is paid to the later Plato, the Plato of the *Parmenides*, the *Sophist*, and the *Laws*. It would seem necessary to take account of the doctrinal development and to avoid reducing Plato to merely the author of the *Republic*. Competent scholar that he is, Father Brady is well aware of the theories regarding change in Plato's thought; but he agrees with Cherniss in rejecting the view that the ideas are identified with numbers and

generated by the One and the Dyad as "a fabrication to explain later mutations of the theory of the Ideas and is without a shred of evidence" (p. 82). Aristotle's references to the Lecture on the Good are considered "vague" and "of little apparent value," though it is admitted that the problem needs further study (p. 82, n. 12). It would seem that contrary views are too easily set aside.

The sweep of this introductory text is vast, too vast, in fact, for proper coverage of the leading figures of antiquity. Despite its many merits it falls short of supplying a real need. The instructor who attempts to teach it will find that one semester—the usual period—will be too short. The student will be confronted with a medley of brief accounts of many thinkers and could become confused. More space should have been given to the dominant philosophers; and the Oriental thinkers both ancient and medieval, should have been mentioned only in passing.

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